

**THE MILBANK MEMORIAL FUND  
QUARTERLY  
BULLETIN ~**

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E D I T O R**

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## THE HEALTH EXAMINATION IDEA

by IAGO GALDSTON, M.D.

SIR GEORGE NEWMAN<sup>1</sup> begins his scholarly memorandum on the practice of preventive medicine with the postulate that "The first duty of medicine is not to cure disease, but to prevent it."

This postulate is of relatively recent origin, as recent as the science of preventive medicine. For though as an ideal the prevention of disease has been coexistent with the healing art, as a duty it could not be exacted until the followers of Aesculapius were equipped with the knowledge that makes disease prevention a possibility.

Such a body of knowledge is now available. It is being augmented by a multitude of industrious workers devoted to the study of the subtle workings of the living mechanism, and not a year passes but fundamental information is won through their labors. And it is thus that not only the nature of certain diseases and their effective treatment are revealed, but also that their prevention is made possible.

Knowledge, however, is ever in advance of practice and application. It has been said time and time again that during the next twenty-five years mankind could well afford to cease making new medical discoveries and to concentrate its efforts on the practical application of the medical knowledge now available. This expression is but a novel way of saying that practice is at least twenty-five years behind theoretical knowledge.

In essence it must be so. Facts are rarely instruments and work calls for machinery and techniques. Discoveries are

<sup>1</sup>Newman, Sir George: *An Outline of the Practice of Preventive Medicine*. London, His Majesty's Stationery Office, 1919, pp. 5, 37, 38, 42.

made more or less in isolation. Modern research technique involves specialized studies of minute segments of large problems. Before the findings of a variety of laboratories and specialty clinics can be practically applied to the benefit of mankind, they must be synthesized, integrated, and special machinery and techniques must be developed. These tasks are no less great than those faced by the research workers and they call for talents as rare as those of the analysts.

This phase of the problem of applied versus theoretical medicine is described with eloquent terseness by Sir George Newman in his discussion of the need for synthesis and integration in medicine. "The student of the history of general or particular movements in human affairs is well aware that at any given point in progressive thought he will find one or other of two characteristics dominant, namely, extension or consolidation. The extension reveals itself in a reaching-out after new conceptions and expression, analysis, differentiation, and specialism. At other times there comes the need of summary, of unification, of synthesis as the governing idea—not necessarily of new discovery but of new and wider application and interrelation.

"Medicine has lately passed through a period of gestation characterized by germination, new formations, subdivision, and differentiation—not without its analytical, schismatic, and centrifugal dangers—and it is come now in our day to the need of integration. For an underlying unity is necessary if we would avoid that disintegration and dissolution which follow when differentiation proceeds in one-sided fashion. *The predominant need, both in medical education and application is simplification and integration, first in the thought and understanding of the meaning and destiny of Medicine, secondly in practice.* This need lies at the basis of any new apprehension of Preventive Medicine.



"Nor must the synthesis of the future be only one of conception and of interpretation; there must also be adequate provision of facilities for the medical man to practice the *whole* art of medicine, to correlate his medical and surgical knowledge, his preventive and curative efforts, to exercise his full wide function to the benefit of the community."

I have quoted freely from Sir George Newman's memorandum for two reasons; because of the felicitous manner in which he has delineated the problem with which we are herein concerned, and because his conclusions bear so pertinently on our own thesis, the health examination idea.

Health examinations are not being promoted simply because they are "good for you." There is behind the movement a compelling historical necessity. The practice of health examinations promises to make available to the physician the *modus operandi* for the goal defined by Sir George Newman, namely, "to exercise his full wide function to the benefit of the individual, and hence too, of the community." The health examination is the counterpart of and the complement to public health, promising to do for and with the individual as much as public health has been able to accomplish with mankind *en masse*.

The health examination movement has had a checkered history. It had its prophet and pioneer in the London physician Dr. Horace B. Dobell<sup>2</sup> and its independent American proponent in Dr. George M. Gould<sup>3</sup> of Philadelphia. Theirs, however, were farsighted visions which antedated realization by many decades. The movement for health examinations found its inception and first practical application, not in the ranks of the medical profession, but as part of the

<sup>2</sup>Dobell, Horace B.: *Germs and Vestiges of Disease*. London, John Churchill, 1861, pp. 154-155.

<sup>3</sup>Galdston, Iago: Horace Bengie Dobell, Pioneer of the Health Examination. *The Health Examiner*, January, 1932, i, No. 10, pp. 7-12.

business and welfare services of the life insurance companies.

As early as 1911 the Provident Savings Life Assurance Society began offering and providing health examinations to its policy holders. The Life Extension Institute was created in 1914. Organized medicine as represented by the American Medical Association did not join the movement, so to say, until 1922, when by resolution it created a committee to study the matter and to prepare history and record cards for distribution to individual physicians.

Though we cannot afford to dwell upon the matter here, there is a deep significance to this sequence of events, for it has made its impression on the very trend and nature of the movement. Health examinations, promoted as a life extension service by insurance companies and so-called health examinations provided by various industries, differ markedly in their primary viewpoints, their objectives, and their effectiveness, from health examinations given by the general practitioner to his private patients as a part of personal preventive medicine.

Those interested may find this phase of the history of the health examination discussed in *The Health Examiner* of February and March, 1932.<sup>4</sup> In this contribution we must limit our consideration to the health examination movement as it has been furthered by the official medical societies of Greater New York, an undertaking to which the Milbank Memorial Fund has contributed generously and from the time of the movement's inception.

In May, 1924, the Medical Society of the County of New York passed the following resolution:

"RESOLVED, that the Medical Society of the County of New York immediately take steps through an appropriate

<sup>4</sup>Galdston, Iago: The Genealogy of the Health Examination. *The Health Examiner*, February, 1932, i, No. 11, pp. 7-14.





committee to formulate a feasible and workable plan to promote Periodic Health Examinations through the agency of the general practitioner."

The president appointed such a committee under the chairmanship of Dr. Orrin Sage Wightman. This committee formulated a plan of action based on three objectives:

(1) The education of the physician in the most competent technique of examination.

(2) The formulation of a simple yet adequate data record form.

(3) The development of sustained publicity and educational propaganda which should not be the burden of the doctor, but rather of lay organizations which could, as a civic and public duty, bring the need of periodic health examinations before the people in general.<sup>5</sup>

The first of the two objectives, it was at that time thought, could be well undertaken and achieved by the County Medical Society. The third objective, namely, the instruction of the public, for apparently valid reasons it was neither desirable nor possible for the County Society to promote. The medical profession had neither the necessary financial resources nor the organization required for so large a task as educating the public. In addition there was some question of the propriety of the medical profession undertaking an activity that might seem so much like soliciting business.

It was at this point that the Medical Society of the County of New York turned to the Milbank Memorial Fund for financial support and to the New York Tuberculosis and Health Association for executive help. From each of these organizations the desired assistance was secured. In 1925 the Medical Society of the County of New York launched its

<sup>5</sup>Galdston, Iago: Cooperative Promotion of the Health Examination Idea. *The Physical Examiner*, December, 1927-January, 1928.

first campaign for the medical administration of the health examination. An impressive series of lectures on periodic health examination was delivered to the medical profession at the New York Academy of Medicine under the auspices of the Medical Society of the County of New York. These lectures were published in the *Medical Journal and Record*, and were subsequently reprinted in book form and distributed gratis to the profession and allied groups.<sup>6</sup>

A record form for making, recording, and interpreting the health examination was also formulated and widely distributed. Simultaneously, and this mainly through the agency of the New York Tuberculosis and Health Association, a sustained campaign of education and propaganda was directed at the public.

The original committee, having substantially accomplished the objectives it set for itself, was at the end of the year disbanded. But a similar committee with new personnel was appointed in 1926, and carried further the health examination movement. The chairman of this committee was Dr. Otto H. Leber.

From the very first it became evident that the health examination idea required sustained promotion, among physicians as with the public. There was a good deal of inertia to be overcome within the medical ranks, some skepticism, too, was encountered, and not a little passive opposition. But even more than these the health examination idea needed further and clearer definition. Physicians inquired of those promoting the idea, what the health examination might be expected to accomplish. What, if any, were its virtues, did it serve to prolong life, did it enable the prac-

<sup>6</sup>Lectures on Periodic Health Examination, January 6 to February 3, 1925. Reprinted by the New York Academy of Medicine, *Medical Journal and Record*, 1925, cxxi.

*In the interest of continued good health  
you are urged to visit your physician for a  
health examination at regular intervals.*

*This measure of preventive medicine and  
personal health service is endorsed by the  
Five County Medical Societies of New York  
and the New York Academy of Medicine.*

This card, inserted by the physician in his outgoing mail, serves to remind the patient of the importance of the periodic health examination.

tioner better to discover early pathology in the patient? What were its hazards, how would the neurotic patient be affected? Then, too, there were numerous questions pertaining to its administration. How frequently should patients be reexamined? What constitutes an equitable fee? How might the physician bring his patients into his office for a health examination? The medical aspects of the examination were subjected to inquiry. How elaborate must the examination be to prove effective?

Such and scores of other pertinent inquiries were either specifically addressed to the Committee on Periodic Health Examination or were brought to the fore as the Committee plodded along in its work.

Plodded is used advertently, for the Committee well appreciated the long uphill pull with which it was confronted. Under the able leadership of its chairman, it set to work with a steady sustained application. Medical meetings were held in the New York Academy of Medicine and in practically



every one of the City's special and regional medical societies. The Committee sponsored the production of several motion picture films; a medical film portraying in detail the steps involved in making a health examination (suitable for exhibition to physicians and medical students); a modified version of the same for technical groups and selected lay audiences; and an animated cartoon picture, which in a lighter vein expounded the health examination idea.

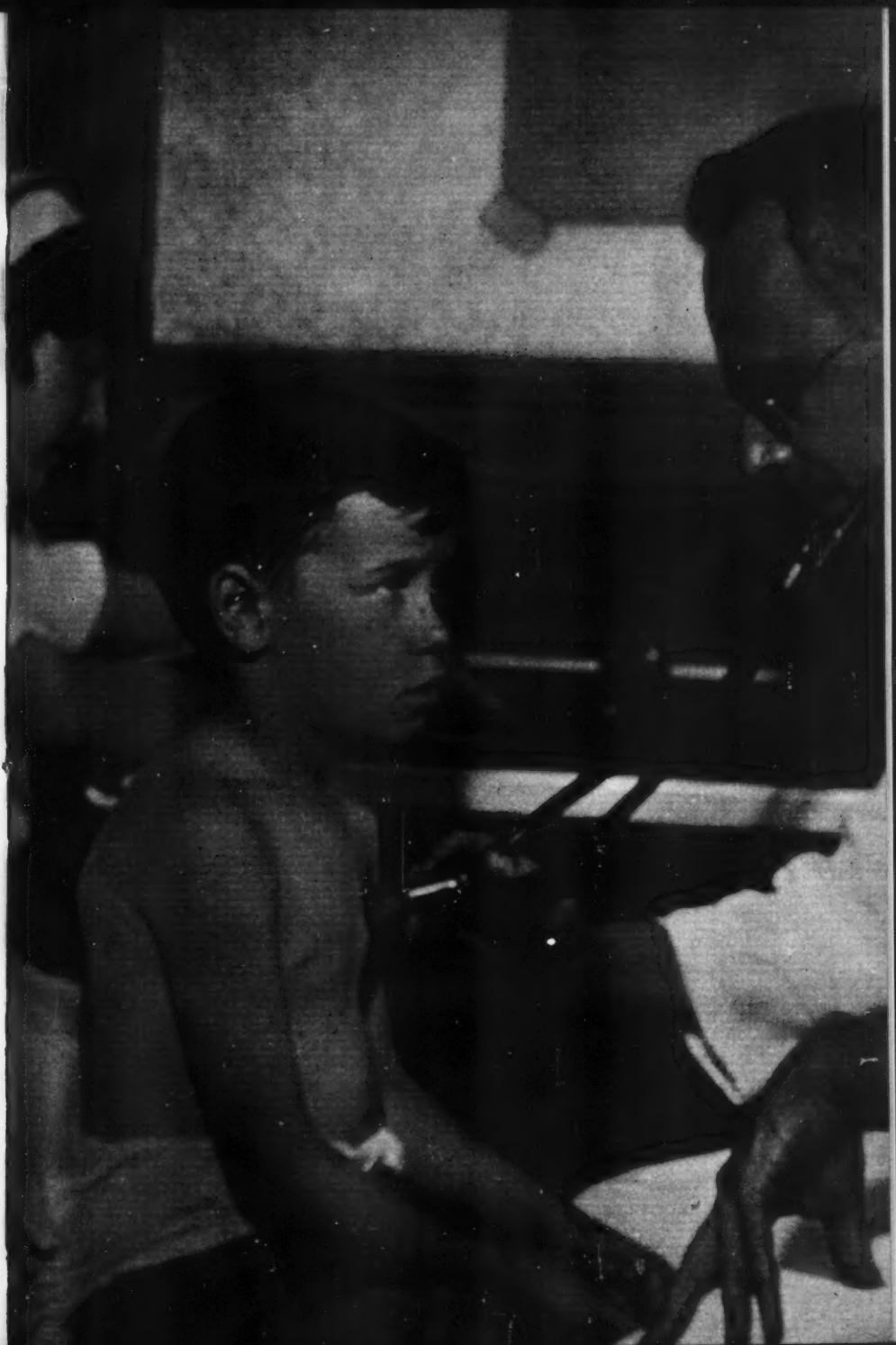
The work of this second committee, as well as that of all subsequent committees, was largely financed by the Milbank Memorial Fund, administrative assistance being rendered by the New York Tuberculosis and Health Association. The funds contributed made possible a widespread public education campaign. Practically every public school, high school, Young Men's Christian Association, Young Women's Christian Association, and many industrial organizations, churches, and women's clubs were addressed by physicians on the health examination. Leaflets and posters were printed and widely distributed. Radio addresses were made on many phases of the health examination.

Arrangements were also made for training physicians in the technique of the health examination, the clinic facilities of the Bellevue-Yorkville Health Demonstration being used.

In this multiform manner the Committee on Periodic Health Examination of the Medical Society of the County of New York carried on its pioneer work, preparing the ground for more intensive and wider campaigns that followed.

During this period the Medical Society of the County of New York was of course not the only body interested in the promotion of the health examination idea. Many of the voluntary health organizations of the City, the insurance companies, many industrial organizations, and the Life Extension Institute, kept up a sustained drive for the wider prac-







tice of this measure of preventive medicine. Other county societies, notably the Kings County Medical Society, became interested in the health examination movement. It was a logical resultant, therefore, that after a number of years of activity, more or less confined to Manhattan, the movement should develop a city-wide scope.

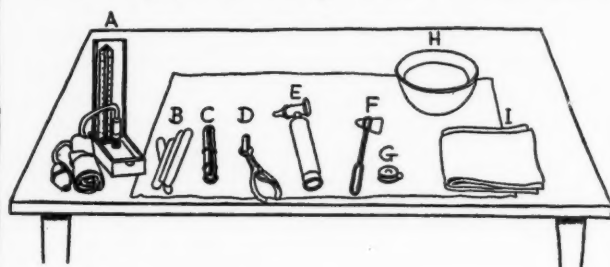
This transpired when in 1929 Dr. A. J. Rongy presented a resolution to the Medical Society of the County of New York, calling for the creation of a Greater New York Committee on Health Examination, to coordinate the health examination activities of the Five County Medical Societies.

The resolution was adopted and a Greater New York Committee on Health Examination was appointed. The Five County Medical Societies of Greater New York joined in a city-wide campaign, and the work of the committee was launched, under the chairmanship of Dr. Rongy.

This Committee turned as the former ones did to the Milbank Memorial Fund for financial assistance. The appeal was liberally responded to, and with additional contributions from the Metropolitan Life Insurance Company, the Altman Foundation, the Life Extension Institute, the New York Tuberculosis and Health Association, the Brooklyn and Queensboro Tuberculosis and Health Associations, and the Medical Society of the County of New York, a substantial budget was made available to the Committee. The Committee was thus enabled to project a campaign for health examination promotion on an unparalleled scale.

The details of that campaign conducted in 1929 and 1930 have been reported in the publication "For Health."<sup>7</sup> The interested reader is referred to the report for a description of

<sup>7</sup>For Health. A Report of the Activities and an Evaluation of the Results of the Campaign for Health Examination Conducted by the Greater New York Committee on Health Examination, October 15 through December 31, 1929. New York, The Greater New York Committee on Health Examination, 1930.

**Medical Equipment Arranged for Health Examination.**

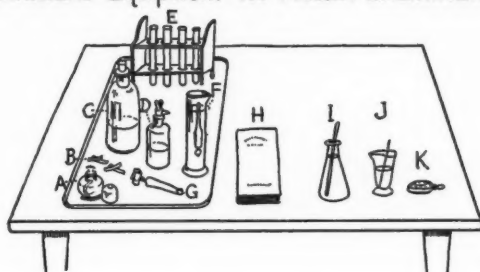
- A. Blood pressure apparatus
- B. Tongue depressors
- C. Flashlight
- D. Nasal speculum
- E. Otoscope
- F. Reflex hammer
- G. Steel tape measure
- H. Antiseptic solution
- I. Towel

the nature and scope of the activities carried on. Here it is pertinent to observe that in so far as the campaign was primarily addressed to the public, the results as judged by the amount of public interest and response elicited were highly gratifying.

The public, it was demonstrated, is receptive to the health examination idea. It readily grasps its motives, and is easily persuaded as to its worth. But its administrative application still presents large and unsolved problems. Among these the attitude of the profession looms large.

When the campaign, as planned, was over, and stock taking was in order, it became apparent that there was real

Technician's Equipment for Health Examination



- A. Alcohol Lamp
- B. Litmus Paper (Acid & Alkaline)
- C. Benedict's Solution
- D. Acetic Acid in dropper bottle
- E. Test Tube Rack
- F. Urinometer
- G. Test tube Holder
- H. Tallquist Scale
- I. Thermometer in Alcohol
- J. Hagedorn Needle in Alcohol.
- K. Midget Ingersoll Watch

danger that the demand for health examinations might be so stimulated as to exceed the supply; furthermore, that the movement was in danger of suffering a serious setback by the superficial manner in which the health examination might be administered by those unsympathetic to its aims and uninformed on its proper nature.

These convictions deeply impressed those most intimately associated with the campaign and led to a thoroughgoing analysis of the entire health examination situation. The outcome of this analysis was the projection of a five-year cam-

paign addressed primarily to the physicians, and aimed to establish the health examination idea as an integral part of personal preventive medicine.\*

To a large percentage of medical practitioners who have been schooled and experienced in curative medicine, personal preventive medicine is, however, a distinctly new conception. For many decades preventive medicine has meant only public health, left for administration to the health authorities. Also, preventive medicine has been understood to mean only the prevention of diseases of an epidemic nature.

There was some justification for this restricted conception of the meaning of preventive medicine in the days when our science was young. But in recent times when medicine has made such marvelous progress in the exposition of the cause and prevention of such diseases as are not due primarily to infectious agents but to poor and defective nutrition, to deficient personal hygiene, to functional abuses, and the like, preventive medicine must be understood to possess a much broader scope, a scope in which the private practitioner has a great opportunity for usefulness and an obligation as wide as that of the public health official.

The time has indeed come when for the emergency service in disease which the physician is called on to render, the continued health supervision of the patient might be substituted. This would redound to the benefit of the patient, the physician, and to medicine as a whole.

Such then is the broad thesis and the task to which the Greater New York Committee on Health Examination is committed and to which it is dedicating its efforts. The problem of its exposition and achievement is one of an educational nature. The Committee created an educational instrument

\*Five Year Programme of Activities. New York, The Greater New York Committee on Health Examination, 1930.

suitable to its work, *The Health Examiner*, a monthly publication addressed to the medical profession and devoted exclusively to the promotion and exposition of the practice by the private practitioner of personal preventive medicine and the health examination idea.

The activities of the Greater New York Committee attracted the attention of many private and public health organizations throughout the world, and numerous requests for sample copies of the Committee's publications as well as subscriptions to *The Health Examiner* have been received.

While the Committee restricts its major activities to Greater New York, it has felt impelled to respond to the numerous requests received from other county medical societies, private and public health organizations. *The Health Examiner*, in addition to being sent to every physician in

This monthly publication, addressed to the medical profession, is "devoted exclusively to the promotion and exposition of the practice by the private practitioner of personal preventive medicine and the health examination idea."

<h1 style="margin: 0;">THE HEALTH EXAMINER</h1>	
<p>APRIL</p>	<p>1932</p>
<p>THE HEALTH EXAMINER comes to you from The Greater New York Committee on Health Examination representing the Five County Medical Societies of Greater New York.</p> <p>This is the first issue of a publication devoted to a discussion of the Health Examination which the Committee hopes to make available to you monthly. The health examination is one of the most important measures before the medical profession. Properly understood and applied the health examination idea promises to profoundly affect for the better the mutual relations of patient and physician.</p> <p>The Greater New York Committee on Health Examination is now engaged in putting into execution a carefully formulated Five-Year Programme of activities to advance the health examination idea among both physicians and the general public.</p> <p>THE HEALTH EXAMINER will be distributed to all the practitioners of Greater New York. It will keep the medical profession informed of the progress of the Five-Year campaign. In addition, it will publish from time to time especially prepared and authoritative articles on all phases of the theory and practice of the health examination. It will also supply specific information and data of practical value to physicians in making health examinations.</p>	
<p>Vol. I</p>	<p>No. 1</p>
<p>THE GREATER NEW YORK COMMITTEE ON HEALTH EXAMINATION</p>	

MEDICAL SOCIETY OF THE COUNTY OF NEW YORK	
Periodic Health Examination	
GUIDE CARD FOR HEALTH EXAMINATION	
Under Heading of:	MAKE SPECIAL INQUIRY ABOUT:
<b>OCCUPATION:</b>	Character of work performed? (Manager or Steno, for example.) Nature of industry? (Steel foundry, Lead Works or Mercantile.)
<b>FAMILY HISTORY:</b>	Relationship of affected persons? Hereditary factors? e.g. Vascular or Cardio-Renal Disease Tendency: Note causes of death which might have a bearing on applicant's condition.
<b>PREVIOUS HISTORY:</b>	<b>Infectious Diseases:</b> Scarlat fever, diphtheria, whooping cough, etc? Syphilis, gonorrhea, malaria. <b>Vaccinations:</b> Smallpox? <b>Immune diseases:</b> Typhoid fever, diphtheria, scarlat fever. <b>Other Diseases:</b> Rheumatism, gonorrhea, pharynx, hemiplegy, frequent colds, migraine, nervous breakdown. <b>Menstrual:</b> Irregularity, abnormal flow, leucorrhoea, etc. <b>Gynecological:</b> Menorrhagia, metrorrhagia, number of pregnancies, character of labor.
<b>HABITS:</b>	<b>Food:</b> Regular hours? Glass cooking, refrigerator, or lunch counter? Married meals? Moderate or heavy eater? Excess of meat, eggs, pastry, sweets, delicatessen, condiments or seasoning, fried or roasted food? <b>Proportion:</b> Carbohydrates, proteins and fats, suited to applicant? <b>Sleep:</b> Sufficient number of hours? Disturbing factors, (noise, especially if night worker)? <b>Ventilation:</b> Bedroom? Fuel used in cooking? <b>Alcohol:</b> Specify average number of glasses of various types of liquor taken per day?
<b>WORKING CONDITIONS:</b>	<b>Hazardous substances:</b> Poisonous gases, vapors, fumes or dust with which applicant may regularly or occasionally come in contact? Character of dust? <b>Sanitary Conditions:</b> Defects of ventilation, lighting, heating, moisture, or pollution? <b>Mental or Physical Strain:</b> Factors causing secondary or extreme mental tension or physical strain should be especially noted in so far as they may cause fatigue. Overtime data.
<b>PRESENT CONDITION:</b>	<b>Respiratory System (Cardio-Vascular):</b> Cough, shortness of breath, pain (pleuritic or pleurotic, etc.) <b>Nervous and Mental:</b> Signs of maladjustment, nervous breakdown, psychosis, or organic nervous disease. <b>Gastro-Intestinal:</b> Nausea, vomiting, pain (time of occurrence), location and character, etc.
<b>PHYSICAL EXAM.:</b>	<b>Nutrition:</b> Undernourished or overweight? <b>Eyes:</b> Note conjunctivitis; infections of conjunctivae; other pathologic states; examine eye-ground when necessary. <b>Throat:</b> Note condition of tonsils and pharynx. Larynx when indicated. <b>Teeth:</b> Note caries, pyorrhea or other condition requiring dental care. <b>Gonorrhea:</b> Gonorrheal disease? <b>Orthopedic Defects:</b> Note spinal curvature, flatfoot or postural defect or skeletal pathology. <b>Glandular Disturbances:</b> Presence of enlarged glands in axillary, axillary, or parotid glands. Also, any abnormality of thyroid, thymus or pituitary glands. <b>Reflexes:</b> Pupillary reflexes, knee jerk, etc. <b>Gynecological:</b> Infection, leucorrhoea, displacement, etc.
<b>LABORATORY TESTS:</b>	Wassermann test and also other laboratory examinations when indicated. (X-ray, blood examination, sputum, feces, gastric contents, etc., etc.)

WEIGHT AND HEIGHT CHART ON OTHER SIDE

Greater New York, is sent to every county medical society and the leading medical libraries in the United States, and to some two hundred foreign health ministries and health organizations. The Medical Society of the County of Monroe has had a special Rochester edition of *The Health*



*Examiner* distributed monthly to its own society members.

While the publication and distribution of *The Health Examiner* is a major activity with the Committee, it is not its sole preoccupation. To implant the idea of personal preventive medicine, to make it a routine part of the every-day practice of the general practitioner, necessitates a multiform activity. We are obliged to reach back to the medical school where young physicians are trained and where lie, perhaps, our best hopes for the ultimate attainment of our goal. There are scores of administrative problems to which the Committee must devote its attention. Physicians need assistance in bringing the health examination to the attention of their patients. To further this phase of the work, the Committee has published and widely distributed a card to be enclosed in the mail addressed by physicians to their patients. This card is shown in an accompanying illustration.

Literature for distribution through the doctor's office is being prepared and distributed. The Committee has committed itself to the publication of a handbook on personal preventive medicine which will summarize this phase of medical practice, and it is expected that this volume will be widely distributed.

Through sustained endeavor, it is expected that both the medical profession and the public will be persuaded of the economic and health virtues of the practice of personal preventive medicine and of the health examination.

This brings our recitation to date. The prospects for an ever more widespread appreciation of the worth and fundamental usefulness of the health examination are good. Out of our seven years of experience in the promotion of the health examination idea has come a better understanding of the idea itself, its tortuous history, and its place in the every-day medical practice of the general practitioner.

The Committee feels that it does not overestimate the significance of its work, or the promise of the health examination idea, in maintaining that in the practice of personal preventive medicine lies the solution to many phases of the difficulties that beset medicine today, as well as the dawn of a great era in which the newer facts on disease prevention and the improvement of human existence will find full application, to the glory of the profession and the benefit of the human race.

## STATISTICS OF MORBIDITY<sup>1</sup>

by EDGAR SYDENSTRICKER

### I

"**M**ORBIDITY" is one of the terms in the definition of which the dictionary resorts to vague synonyms. We are told that morbidity is a "diseased" or "abnormal," "not sound," "not healthy," "sickly" state, and are referred to our livers in order to illustrate its meaning. Further reflection might lead us to ask how much morbidity is "normal" reaction to environment, or what proportion of illnesses is merely an unavoidable concomitant of the wearing out of human clocks, to use Pearl's metaphor, some of which are set by heredity to run a shorter time than others. When is death "normal"? At threescore years and ten, or at the century mark, or even at Methuselah's reputed age? How much of Methuselah's life was occupied in dying?

I am afraid that purely philosophical attempts to define the term will lead to a state of obfuscation—which might well be regarded as a form of morbidity in itself. Let us concede at the outset that morbidity is not as precise a concept as the statistician would desire; that it is a relative term, since one person may feel ill, stay away from work longer, be a greater nuisance than another who has the same objective symptoms; and that morbidity is essentially a subjective phenomenon. But let us take cognizance of the fact that illness, to use the commoner and more expressive term, is an undeniable and frequent experience of every person except, of course, the favored nonagenarian who, after a career devoted to tobacco, hard liquor, and perhaps other gayer irresponsibilities, is alleged in newspaper interviews

<sup>1</sup>De Lamar Lecture in Hygiene at the School of Hygiene and Public Health, the Johns Hopkins University, December 15, 1931.

never to have been sick a day in his life. Unlike birth or death, which can come but once to an individual, illness may occur often, its frequency depending not only upon its nature, its causes, and upon the susceptibility of the person concerned, but also upon its duration in relation to the length of time considered. Obviously the calculus of probability can not be used in morbidity statistics in the same ways as in birth or death statistics. Yet, in spite of difficulties of reducing it to precise statistical unity, illness is a *datum* measurable in fairly exact terms of duration, degree of disability, symptoms, cause, and sequelae. From the point of view of diagnosis it has an obvious advantage over death since the ill person is still subject to observation whereas the dead are unable to give further data except through autopsies. Statistics of illness can afford an indication of vitality that is not less biologically significant and is more illuminating than mortality. They portray the condition of a people's health far more delicately than death rates. They reveal the prevalence and incidence of disease in a population in a manner that is as useful to the student of society as clinical observation of the individual patient is to the physician.

## II

The development of morbidity statistics has been very slow, and they are yet in their infancy. Their tardy progress may be ascribed to three principal reasons. One is expressed by the truism that statistics of a given kind are not continuously collected on a large scale unless there is a sufficient demand for their use in some practical way. A second reason is that the demand has come for morbidity statistics of special kinds and for specific population groups; little, if any, standardization in morbidity statistics has been attained. A third reason follows in some sense from the second—a confusion as to the concept of morbidity arising from differ-

ences in the uses to which the statistics are put. In addition to this confusion, differences in methods of collecting data, variety in definitions of a "case" of illness, the existence of peculiar factors that affect the accuracy of the record, the time element involved, and similar difficulties, have been deterrents to the accumulation of a large body of homogeneous morbidity data. It will not be possible upon this occasion to review the history or to forecast the future of morbidity statistics, but the opinion may be ventured that it is doubtful that we shall ever need, and therefore shall ever have, continuous registration of illness in accordance with a standardized procedure such as has been established in the field of natality and mortality. On the other hand, the future development of morbidity data promises great usefulness in two main directions:

- (1) As an epidemiological method whereby population groups can be accurately observed continuously in order to ascertain how actual conditions of human society influence the incidence and spread of disease.

- (2) As a means of portraying from time to time and for various population groups and areas, the problems of disease in far better perspective than can be given by statistics of mortality or by any other data practicable in the near future.

Our discussion purposely will be centered on the beginnings of morbidity statistics in the second direction, although the greater opportunity for development seems to me to be in the first.

### III

Although many kinds of morbidity statistics exist, their varieties may be classified in five general groups. I shall refer to each very briefly in order to present in somewhat greater detail some results of one study of illness.

- (1) *Reports of Communicable Diseases.* In a strict sense,

these are not morbidity data since illness is not necessarily involved. They exist, or *should* exist, for a specific purpose, namely the notification of those diseases for which reasonably effective methods of administrative control actually have been devised. Only to a limited extent are communicable disease reports useful for epidemiological studies. As Hedrich and I have shown,<sup>2</sup> not only are the reports of most diseases extremely incomplete but their incompleteness varies according to age.

(2) *Hospital and Clinic Records.* These are of little use in determining the prevalence or incidence of illness in a population, either in terms of a gross rate or from any specific disease. Properly made, as they rarely are, they are valuable for clinical studies and may become more so as the tendency to hospitalization increases and as clinicians become trained in analytical methods.

(3) *Insurance and Industrial Establishment and School Illness Records.* The outstanding examples are the sickness experience of European insurance systems and of absences on account of illness of workers in industrial establishments in the United States. It is essential to bear in mind that important conditions affect the content, meaning, and validity of the data, although the concept of illness is more than usually specific because of technical and arbitrary definitions imposed for administrative reasons. One condition is the inclusion of only persons well enough to be employed. Another is the exclusion of all cases except disabling illnesses. Another is the exclusion of illnesses of short durations by reason of regulations as to the "waiting period," or the period of disabling illness that must elapse before the patient begins to draw sick benefits and therefore before the record of illness begins. Thus the annual disabling illness rate among male industrial workers with a waiting period of one week was 104 per 1,000, whereas the

<sup>2</sup>Sydenstricker, Edgar, and Hedrich, A. W.: Completeness of Reporting of Measles, Whooping Cough, and Chickenpox at Different Ages. *Public Health Reports*, June 28, 1929, lxiv, No. 26, pp. 1537-1543.

rate for males in a large public service company without any waiting period was 1,044 per 1,000.<sup>3</sup> Again, "if wages are lost entirely when the worker is absent on

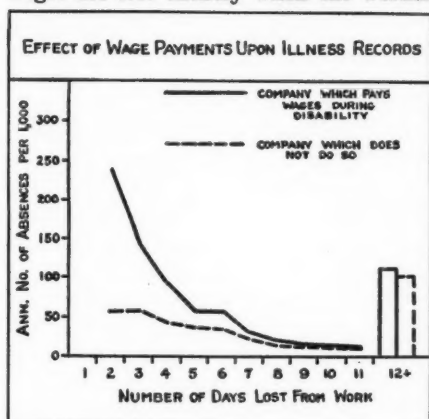


Fig. 1. Frequency of absence due to disability among male employees of a company which pays wages during disability as compared with male employees of a company not paying during disability.

account of sickness," as Brundage has shown, "the record usually shows a much lower rate of absences of relatively short duration than when full wages are paid during sickness" (Fig. 1), although malingering was not found to be an important factor in two establishments studied.<sup>4</sup> Malingering undoubtedly must be regarded as a condition affecting the accuracy of statistics based upon records of disability or absence. The lad who is too sick from a headache to remain in school but finds the fresh air of the baseball field beneficial, may or may not be malingering; at any rate he is often abetted by sympathetic parents. Yet the interesting suggestion has been made by Collins,<sup>5</sup> and illustrated by Downes,<sup>6</sup>

<sup>3</sup>Brundage, Dean K.: The Incidence of Illness Among Wage-Earning Adults. *Journal of Industrial Hygiene*, November, 1930, xii, pp. 342, 347.

<sup>4</sup>*Ibid*, p. 340.

<sup>5</sup>Collins, Selwyn D.: The Place of Sickness Records in the School Health Program. Transactions of the Fifth Annual Meeting of the American Child Hygiene Association, October, 1928.

<sup>6</sup>Downes, Jean: Sickness Records in School Hygiene. *American Journal of Public Health*, November, 1930, xx, pp. 1199-1206.

that records of illness involving absence from school, if kept with some degree of specificity as to the nature of the illness, profitably could be used to complement the findings of the relatively infrequent and usually unsatisfactory physical examinations as a method of referring certain children for diagnosis and treatment.

(4) *Illness Surveys.* These have been made, notably by the Metropolitan Life Insurance Company, to ascertain what the *prevalence* of illness is at a given date in sample populations. The method of these surveys is a simple house-to-house canvass. The results indicate that about 2 per cent of the population, including persons of all ages and at home or at work, are ill. The *incidence* of illness within a given period is not revealed by this method and, when the results are analyzed by cause, obviously the proportion of cases of long duration and of chronic type is much higher than is shown by records of incidence.

(5) *Records of the Incidence of Illness in a Population Continuously or Frequently Observed.* Although this method was first employed on a considerable scale in the field of study of a single disease, pellagra, by Goldberger and myself and our associates,<sup>7</sup> the first attempt so far as I am aware to record all illnesses continuously in a typical population on any considerable scale was made by the United States Public Health Service in Hagerstown, Maryland, in 1921-1924. The same methods, with some elaborations, have been used in several subsequent morbidity and epidemiological studies. The two main purposes of the Hagerstown study were (1) to ascertain the annual illness rate in a representative population and (2) to develop an epidemiological method whereby human populations could be observed for as complete an incidence as possible of various diseases, so far as they are manifested in illness, under actual conditions of community life.

<sup>7</sup>Goldberger, J.; Wheeler, G. A.; and Sydenstricker, Edgar: A Study of the Relation of Diet to Pellagra Incidence in Several Textile Communities of South Carolina in 1916. *Public Health Reports*, 1920, xxxv, pp. 648-713, and later publications.



IV

Before referring to some of the results of this study from the viewpoint of general morbidity, it is important to consider the nature of the data obtained by the method of frequent and continuous observation employed in this and later similar studies.

Experience has shown that the completeness of a record of illness depends upon at least three important conditions. One is its severity and nature; the second is the length of the period for which the informant is asked to report; the third is the subjectivity of the record itself. Nearly every adult will remember an illness due to typhoid fever incident upon himself or in his family if it took place within the preceding ten or twenty years; few will recall a brief illness due to a common cold unless it occurred within a very short period immediately preceding the date of inquiry. Illnesses of a minor kind are observed and remembered when incident upon the informant himself with a greater degree of completeness than when incident upon others, even in the same family.

A few illustrations may be given. The annual incidence of illness of respiratory nature in families reported upon every half month was two attacks per person,<sup>8</sup> whereas in families reported upon at intervals of six to eight weeks it was only about 0.7 attacks per person.<sup>9</sup> The annual illness rate for women reporting upon themselves was 70 per cent higher for respiratory conditions, 130 per cent higher for nervous conditions, and 8 per cent higher for digestive disorders than the rates for women reported upon by others in the same

<sup>8</sup>Townsend, J. G., and Sydenstricker, Edgar: Epidemiological Study of Minor Respiratory Diseases. *Public Health Reports*, January 14, 1927, lxii, No. 2, p. 112.

<sup>9</sup>Sydenstricker, Edgar: A Study of Illness in a General Population Group. *Public Health Reports*, September 24, 1926, lxi, No. 39, p. 12.

household.<sup>10</sup> On the other hand, respiratory attack rates in families where adult males were the informants were higher for themselves than among adult females in the same families whereas all objective observations point to a higher rate among women than among men.<sup>11</sup> Such experiences as these point to the necessity for taking influencing conditions into account that only participation in the collection of the data can possibly reveal.

## V

I would have liked very much upon this occasion to have been able to bring you fresh reports upon several field studies of morbidity using or involving the recording of illness by the method of continuous observation of population groups. Unfortunately these studies either are still under way or are as yet in the process of tabulation. One is the observation of a population group of 5,000 in a city of nearly 200,000 people and another is of a group of similar size in a rural area. The purposes of these studies are not merely to secure a record of the illnesses in order to depict the condition of a typical population's health in so far as it is revealed by illness, but to ascertain the extent to which illness is receiving medical service and the population itself is being served in various ways by the public health agencies, both official and unofficial. In these and other field inquiries under way, the reasons why health services of different kinds are not used by the families and individuals are being ascertained in order to learn the attitude of the public and to appraise the efficiency of educational efforts. Thus the underlying method of continuous observation of a population is being applied

<sup>10</sup>Sydenstricker, Edgar: The Illness Rate Among Males and Females. *Public Health Reports*, July 29, 1927, lxii, No. 30, p. 1952.

<sup>11</sup>Sydenstricker, Edgar: Sex Differences in the Incidence of Certain Diseases at Different Ages. *Public Health Reports*, May 25, 1928, lxiii, No. 21, pp. 1269-1270.

in these two studies as a mode of measuring the effectiveness, from an important point of view, of public and private medicine—using the term “medicine” in its broad sense. A third study, in which this method is being employed, was conducted on a large scale in the United States in order to find out, with far greater accuracy than ever before, the extent to which families of different economic status actually availed themselves of medical, hospital, and other services and the actual costs of these services in detail for every illness during the period of a year. This inquiry extended into communities of different types and sizes and in many geographic areas of the country.

This particular method of the morbidity study—the continuous or frequent observation of a population—is thus being adopted for other purposes in the fields of public health and medical economics. It is essentially the method of the field zoologist, botanist, and the laboratory worker applied to the study of human populations living under conditions as they are found, but with far greater possibilities of precision in and completeness of observation than routine records made for other purposes can ever achieve. It will doubtless become a most valuable epidemiological tool as the technique of observation for specific diseases is divided and improved through experience. I need not refer here to the studies of respiratory affections conducted at the Johns Hopkins University which are notable examples of this use of the method. Epidemiological method, however, does not lie within our subject; I merely mention it in order to illustrate the fact that the study of morbidity is developing into an epidemiological mode that is both scientific and practicable.

VI

For an illustration of morbidity studies used to depict the

health of a population we may turn to the one made in Hagerstown.

The Hagerstown morbidity study<sup>12</sup> included 16,517 "years of observation," or an equivalent of a population of 7,079 persons observed continuously for twenty-eight months beginning December, 1921. Illnesses were recorded as reported to experienced field investigators visiting each family every six to eight weeks, the reports being made by the household informant (usually the wife) either as experienced by herself or as she observed them in her family.

The results of the study indicated that a fairly accurate record of real illnesses was secured. Less than 5 per cent of the illnesses of exactly stated durations recorded were one day or less in duration. Approximately 40 per cent were not only disabling but caused confinement to bed. It is evident, therefore, that in the main the illnesses recorded were more than trivial in their character, in spite of the fact that in some instances mere symptoms were given as diagnoses. The incidence of acute attacks of specific and generally recognizable diseases was, we believe, recorded with a satisfactory degree of completeness. On the other hand, the incidence of mild attacks, as for example, of coryza, was quite incompletely recorded as judged by data on minor respiratory attacks obtained later by more intensive methods for other population groups.

For this population 17,847 illnesses were recorded in the twenty-eight month period, an annual rate of 1,081 per 1,000 years of life observed, or about one illness per person per year. This illness rate was over 100 times the annual death rate in the same population.

<sup>12</sup>Sydenstricker, Edgar: Hagerstown Morbidity Studies. A Study of Illness in a Typical Population Group. Reprints 1113, 1116, 1134, 1163, 1167, 1172, 1225, 1227, 1229, 1294, 1303, and 1312 from the *Public Health Reports*.

Perhaps the most interesting results of this first morbidity study of a typical population related to the variations in the incidence of illness according to age. Up to the time the Hagerstown study was made the only data on adults came from "sickness" records of European insurancesystems, English voluntary sick benefit societies, and a few American industrial employee funds. Nearly all of these records include only absences from work due to illness lasting a week or longer, and naturally

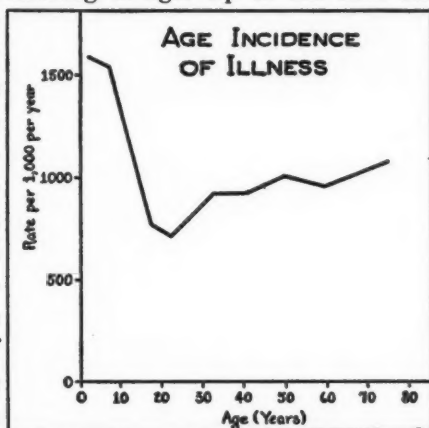


Fig. 2. Age incidence of illness from all causes in Hagerstown, Maryland, as observed in a general population group, December 1, 1921—March 31, 1924.

indicate a rapid rise in the rate according to age because they reflected the serious illnesses only. The Hagerstown study showed that for a group composed of persons at work and at home the illness rate was high even in the younger adult ages and did not rise so quickly with age. The study also furnished data for the first time on children and adolescents with the surprising result that the peak of illness incidence was to be found in childhood and the lowest in the age period 15-24 years, a finding that has been confirmed by later studies employing similar methods. (Fig. 2)

This extraordinary age variation in the illness rate may be interpreted from various points of view, but before you venture any interpretations of it, certain other general considerations should be taken into account.

One is the fact that the proportion of persons suffering frequent attacks, two or more illnesses per year, was highest (45 per cent) in childhood (2-9 years), lowest at 20-24 years

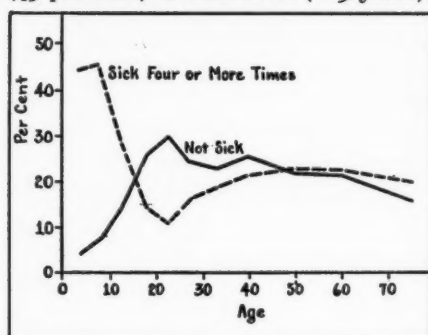


Fig. 3. Proportion of persons at different ages who suffered a specified number of illnesses during twenty-six months.

period. On the other hand, the proportion of persons free from illness during the period was lowest in childhood (5 per cent at 3-4 years), sharply rising through adolescence to a maximum of 30 per cent at 20-24 years, and thereafter declining until the end of the life span. (Fig. 3)

A second consideration is the age variation in the severity of cases of sickness. Severity may be measured in various ways—by duration, degree of incapacitation, cause or nature of the attack, or by fatality. In order to suggest in a general way the ill person's resistance to death at different ages, a convenient mode of expression is the ratio for different age periods. The anticipated variations are clearly indicated, namely that his greatest resistance to death is in childhood, the age period 5-14; his lowest resistance is in infancy and early childhood (0-4 years) and toward the end of the natural life span. Ability to survive illness thus varies markedly from resistance to attacks of illness at different ages,

(11 per cent), rising gradually to a level of about 21 per cent beginning with the age of 35. Thus the age variation in illness was partly due to the age distribution of frequently sick individuals. The proportion of persons sick once a year was about the same in every age

particularly in childhood (5-14) when the average individual suffers from illness frequently but has a relatively small chance of dying, and in the older years when not only does his susceptibility to illness increase but also his chances of death. This is due partly, of course, to differences in the nature of illness occurring at these ages and partly to the diminished ability to resist the diseases which manifest themselves in morbidity. (Fig. 4)

A third consideration is of basic importance—the cause or nature of illness at

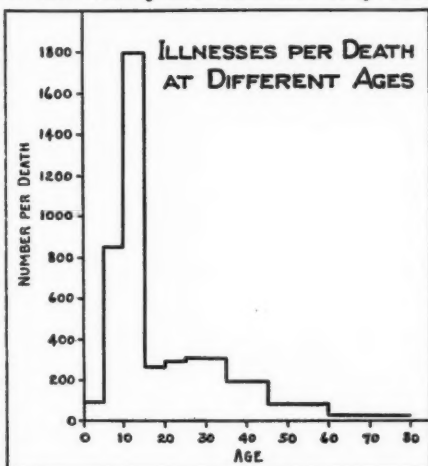
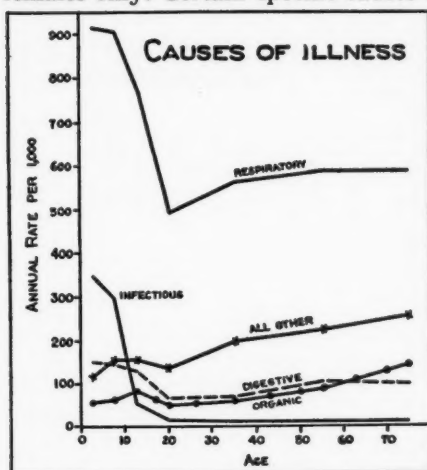


Fig. 4. Illnesses per death at different ages in the white population of Hagerstown, Maryland, December 1, 1921–March 31, 1924.

different ages. I can only summarize very briefly the data collected in the Hagerstown and subsequent studies. The generally known fact that each period of life is characterized by its own distribution of the causes of illness was more clearly and completely defined. In childhood, illness other than respiratory is caused chiefly by communicable diseases, diseases and conditions of the skin, ears, eyes, and teeth, and nervous and digestive disorders; in old age, illness other than respiratory is caused by the organic group of diseases and conditions, those of the circulatory system, nervous system, and kidneys. Illnesses resulting from all these causes are at their lowest level in adolescence and young adult ages. The only major cause which results in a

higher rate of disability in young adult life than at any other age is the puerperal condition, and this, of course, relates to females only. Certain specific causes of illness do have their



highest incidence in the young adult period of life, such as venereal diseases, typhoid fever, and pulmonary tuberculosis, except under conditions of special strain or hazard. But, by and large, this is the age most free from illness. (Figs. 5, 6)

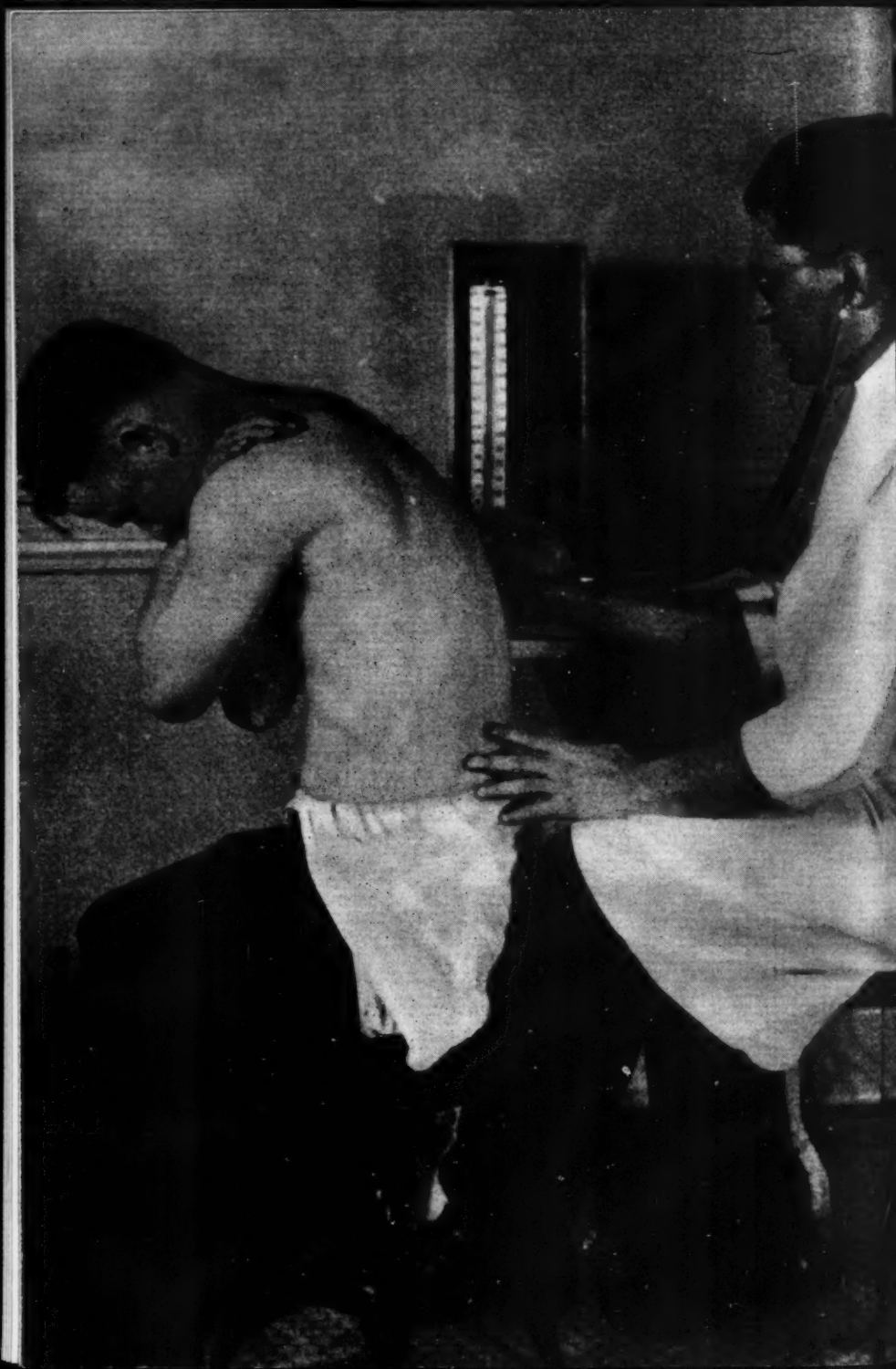
The predominating importance of respiratory diseases and conditions as causes of illness at all ages is a striking fact, but their great height in childhood, their lowest level in adoles-

Fig. 5. Causes of illness at different ages in a white population group in Hagerstown, Maryland, December 1, 1921-March 31, 1924. Under infectious diseases are included the "epidemic, endemic and infectious diseases" and under "organic" the following: diseases of the eyes, ears, circulatory system, teeth and gums, kidney and genito-urinary system.

cent and young adult period (15-24 years), and their gradual rise with the advance of age had not been depicted statistically. Respiratory illnesses were more frequent at both extremes of life than any other general disease group; although, with the exception of infectious diseases, circulatory diseases, and diseases of the bones and of "organs of locomotion," which so clumsily describe diseases that affect certain muscles, nearly all of the major groups of causes of illness tend to appear among the very young and among the old.







In contrast to the organic troubles which so definitely begin to be manifested in middle life and which characterize old age, are the infections and the diseases and conditions affecting the skin, teeth, eyes, and ears that occur with greatest frequency in childhood.

A fourth consideration is the differential illness rates according to family economic status. After taking into account the differences in the age distribution of persons in different economic classes, the annual illness rates for Hagerstown were 991 per 1,000 for the highest

economic class, 1,068 for the middle or "moderate circumstances" class, and 1,113 for the "poor." These differences are not of the same magnitude as those found previously for infant mortality, tuberculosis, or pellagra, for example. Doubtless one reason was that the classes were not so sharply defined since the classification was based on the general impression of the investigator over two years of observation rather than upon an exact appraisal of income. A somewhat detailed analysis of the data, however, revealed the facts that the association of illness with poor economic status (1) appeared for certain causes only, and (2) was indicated in adult life and not in childhood or adolescence. An association

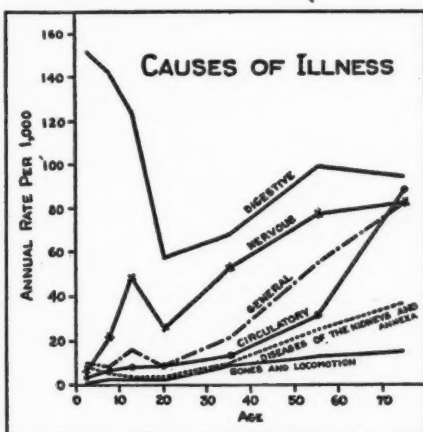


Fig. 6. Variations, according to age, of certain groups of diseases which were primary causes of illness in a white population group in Hagerstown, Maryland, December 1, 1921-March 31, 1924.

with poor economic status was indicated for respiratory diseases, rheumatism, nervous conditions and disorders, and accidents. The commoner infectious diseases—measles, whooping cough, and chickenpox, for example—were not respecters of economic class. The lack of an association with favorable economic status with respect to diseases and conditions of the eyes and ears and of the circulatory, digestive, and eliminatory organs, may reflect the fact that such cases were more frequently attended by physicians and therefore more accurately described for the higher economic class than for the lower.

## VII

From the many interesting and suggestive data yielded by morbidity studies of this nature we may select one more fact. It is this: The general picture given by records of illness according to cause—or, more precisely, according to the *kind* of morbidity—is in sharp contrast to that given by mortality statistics. Respiratory diseases and disorders account for 60 per cent of illness as against about 20 per cent of deaths; the general group of “epidemic, endemic, and infectious” diseases accounts for 8 per cent of illnesses, whereas only about 2 per cent of the deaths were ascribable to this group; digestive diseases and disorders caused or characterized 10 per cent of the illnesses as against 6 per cent of the total mortality. On the other hand, the group of “general” diseases (which includes cancer), the diseases of the nervous and circulatory systems, and the diseases of the kidneys and annexa were relatively much more important causes of mortality than of morbidity. The diseases of the heart and circulatory system show the sharpest contrast, 24 per cent of deaths being ascribed to these conditions as against only 2 per cent of illnesses. In other words, these diseases manifest themselves in relatively few instances of illness, although un-

doubtedly they shorten life and make life less efficient and enjoyable while it lasts.

VIII

I hesitate to draw the most obvious conclusion from the facts so far yielded by all studies of morbidity because I do not like to close on a note that might be thought discouraging. I have confidence, however, in the stimulating challenge of facts. You may remember the soliloquy of *Faustus* upon the choice of a profession, written nearly 350 years ago by Christopher Marlowe, in which he weighed the success of medicine in these words:

"Summum bonus medicinae sanitas  
The end of physic is our body's health.  
Why, Faustus, hast thou not attained that end?  
Are not thy bills hung up as monuments, whereby  
Whole cities have escap'd the plague, and  
Thousand desperate maladies been cured?"

So, today, we may apply to preventive medicine the test afforded by statistics of illness. It is true that some of the plagues and pestilences of Marlowe's day have been banished from a part of the world; that many more maladies have yielded to modern treatment; that millions of people have escaped certain diseases and have lived lengthened lives. These achievements are monuments indeed to scientific discoveries and to the unselfish art of medicine. Yet undeniable morbidity experience in the twentieth century is overwhelming evidence that the goal of preventive medicine, which is a healthy people, is far from being reached. It is impossible to escape the conclusion to which these statistics drive us, that public health and the practice of medicine have as yet barely touched the task of *preventing* the conditions which manifest themselves in actual illness and all that illness implies.

## THE FERTILITY OF SPECIFIC OCCUPATIONAL GROUPS IN AN URBAN POPULATION<sup>1</sup>

by FRANK W. NOTESTEIN AND XARIFA SALLUME

ONE phase of the studies on population problems being made by the Milbank Memorial Fund is concerned with a fact of basic importance to any intelligent effort to control the social and biologic character of the people as well as to the planning of future programs of public health. This is the size of the family in different social classes and in urban and rural areas. Since the size of the family depends largely upon the birth rate, this phase of the Fund's inquiries has been concerned primarily with the fertility of women. So far it has shown, probably more accurately than ever before in the United States, that wide differences in fertility in broad social classes have existed for a long time and that the trends of fertility in these classes have been by no means the same.

It has been clearly indicated by our studies that various social factors are involved in these differences, but our knowledge of their causal relationships is much less satisfactory than our description of the differences themselves. It is inherent in the rather nebulous conception of "social class" that the classes, taken as wholes, differ from one another in income, character of employment, interests, standards of living, education, and achievement, and possibly in physical and intellectual capacities. Any or all of these attributes, whether environmental or genetic in origin, may be related directly or indirectly to the fertility of the classes, but by studying the classes as units we observe only the gross resultant of their complex influences and remain en-

<sup>1</sup>From the Division of Research, Milbank Memorial Fund.

tirely ignorant of the part played by any single attribute.

It is the purpose of the present study to examine the data relating to the fertility of urban women whose husbands followed specific occupations, with the hope that such an examination, in addition to indicating the source of the differences in the fertility of the broad social classes, will, because it deals with relatively clear-cut divisions of the social classes, give some indication of the relation which the distinguishing attributes of the groups may have to their fertility. Little more than suggestive results may be expected, but such results may point the way to further investigation of the influence of specific determinative factors.<sup>2</sup>

The data employed are those obtained by a special tabulation of samples of the 1910 census returns relating to the total number of children ever born to each married woman, the length of the marriage, and the husband's occupation. Neither the women nor their husbands had been married more than once, and both the husbands and wives were of native-white parentage. The data represent a random sample of this group as found in the thirty-three northern cities with populations of between 100,000 and 500,000 in 1910.<sup>3</sup>

Since the specific occupations are represented in the sample by a relatively small number of cases, it is desirable to use an index of fertility which will not be disturbed by a few chance early or late marriages. The index employed in previous

<sup>2</sup>A number of European investigations of the subject have yielded results roughly similar to those of this study, but the populations considered and the data secured are so different that no direct comparisons have been attempted. Two of the more important of these studies are: Fertility of Marriage: Census of England and Wales, 1911, xiii, Part II. Sanders, J., M.D.: *The Declining Birth Rate in Rotterdam*. The Hague, Martinus Nijhoff, 1931.

<sup>3</sup>For detailed description of the data and the methods by which they were obtained, see Sydenstricker, Edgar, and Notestein, Frank W.: *Differential Fertility According to Social Class*. *Journal of the American Statistical Association*, March, 1930, xxv, New Series, No. 169, pp. 9-32.



SOCIAL CLASS AND OCCUPATION	NUMBER OF WIVES UNDER 50 YEARS OF AGE	BIRTHS PER 1,000 YEARS OF MARRIED LIFE (ADJUSTED) <sup>1</sup>	STANDARD ERROR
<b>Professions</b>			
Dentists	596	134	6
Physicians, surgeons, and osteopaths	1,514	137	4
Accountants and auditors	335	145	7
Architects, artists, sculptors, and teachers of art	373	153	8
College presidents and professors	318	163	10
Engineers (civil, electrical, mechanical, and mining)	1,169	164	4
Authors, editors, and reporters	203	169	9
Lawyers, judges, and justices	1,818	173	4
Teachers, school and athletics	516	175	8
Clergymen	553	175	9
<b>Proprietors</b>			
Hotel, restaurant, cafe, lunch room, and saloon keepers	330	124	7
Druggists and pharmacists	208	123	8
Importers and exporters	336	140	9
Stockbrokers, other brokers, money lenders, promoters, et cetera	473	148	7
Retail dealers (except grocers, druggists, and pharmacists)	1,706	151	4
Insurance agents	510	153	6
Manufacturers	684	157	6
Bankers and bank officials	334	158	13
Grocers	476	158	7
Officials of manufacturing	253	161	9
Managers and superintendents of manufacturing	681	162	6
Real estate agents and officials	1,072	164	3
Conductors (steam railroad)	343	167	7
Builders and building contractors	879	190	3
<b>Clerks and Kindred Workers</b>			
Commercial travelers	1,437	140	4
Salesmen and clerks in stores	2,995	140	3
Bookkeepers and cashiers	1,579	153	4
Agents, canvassers, and collectors	631	153	3
Agents and clerks in railroad employ	423	157	7
Other clerks	3,023	157	3
Shipping clerks	324	171	9
Draftsmen	307	179	8
<b>Skilled Workers</b>			
Barbers and hairdressers	439	133	6
Machinists and loomfixers	1,445	169	4
Foremen and overseers	450	170	6
Engineers (stationary)	530	173	6
Policemen	330	175	9
Electricians	563	176	6
Compositors, linotypers, and typesetters	455	176	6
Locomotive engineers and motormen (steam railroad)	436	176	7
Painters, glaziers, and varnishers (building)	673	183	3
Plumbers, and gas and steam fitters	590	188	7
Carpenters	1,964	193	3
Brick and stone masons	316	203	10
Blacksmiths, forgers, and hammermen	318	210	9
Moulders, founders, and casters	263	228	8
<b>Semiskilled Workers</b>			
Waiters and bartenders	304	128	7
Brakemen	308	166	7
Switchmen, flagmen, and yardmen	236	173	8
Motormen (street railroad)	480	177	6
Conductors (street railroad)	571	180	5
Semiskilled operatives in metal industries	461	186	6
Semiskilled operatives in other factories and shops	1,488	191	3
<b>Unskilled Laborers</b>			
Deliverymen	407	203	6
Laborers (n.o.s.) <sup>2</sup> in other industries (except building and metal)	394	213	8
Draymen, teamsters, expressmen, and carriage and hack drivers	883	218	3
Laborers (building, general, and not specified)	654	223	3
Laborers in metal working industries	245	228	9

<sup>1</sup>Adjusted by applying the specific rates for women under 30, 30 to 40, and 40 to 50 years of age, to the age distribution of the wives in the entire sample.  
<sup>2</sup>Not otherwise specified.

Table 1. Children born to women under 50 years of age per 1,000 years of married life, for specific occupational groups of a native-white urban population.



analyses of the same data, i.e., the number of children ever born to women of specific age groups, has accordingly been replaced by the number of children ever born to women under 50 years of age per 1,000 years of married life.<sup>4</sup> This rate holds the length of "exposure to risk" of childbirth constant, but, in its crude form, it does not insure an equality of exposure. Since the early years of married life are more fertile than the later, a group of women would have a higher ratio of births to married years when thirty than when forty years of age. Therefore, the fertility of occupational groups can be compared only when the age distributions of the wives are not widely dissimilar. This condition is approximated by the standardized rates used in this study. These rates were obtained by computing the number of children ever born per 1,000 years of married life for each of three age groups: under 30, 30 to 39, and 40 to 49, and using an average of these rates weighted by the proportion of women of the total sample found in each age group. The resulting rates are those which would have been characteristic of each occupation had the wives in each occupational group been distributed by age groups in the same manner as those of the entire sample. It should be observed that variation in age at marriage can have little influence on such rates.<sup>5</sup>

These birth rates, the number of cases on which they are based, and approximations to their standard errors, are pre-

<sup>4</sup>In the earlier studies, age 45 was arbitrarily selected as the end of the child-bearing period. In this study, the limit has been set at 50 in order to simplify the mechanics of tabulation.

<sup>5</sup>It is possible that the adjusted ratio of births to married years reduces the index for early marrying groups somewhat too much. It carries the implicit assumption that the fertility of a given year of married life is independent of that of the preceding years. Doubtless this is not strictly the case. It seems likely that women who married early and had their families well under way might in the succeeding years be less fertile than equally fecund women of the same age whose married life had only begun.

sented in the accompanying table for the occupational groups represented in our sample by more than 200 cases.<sup>6</sup> The occupations are shown in order of ascending birth rates within their respective social classes, but the standard errors indicate that in most cases significance cannot be attached to the details of this ranking. The business and skilled-worker classes of the previous studies have been subdivided into proprietors and clerks, and skilled workers and semiskilled workers, respectively. The professional and unskilled-labor classes remain unchanged.

The birth rates for the constituent groups of each social class had such a wide range of variation that there were no clear-cut differences between the classes. When the more extreme cases are disregarded, however, it appears that the majority of the rates fall into three fairly distinct groups, the lowest comprising largely those for the white-collar classes, the middle those for the skilled-worker classes, and the highest those for the unskilled laborers. The similarity of the rates for the professional class and those for the two business classes

The writers are indebted to Professor Lowell J. Reed, of Johns Hopkins University, for suggesting the following approximation to the standard error of our rates:

$$\sigma = \frac{\sqrt{(\sigma_1 w_1)^2 + (\sigma_2 w_2)^2 + (\sigma_3 w_3)^2}}{w_1 + w_2 + w_3}$$

where  $\sigma_1$ ,  $\sigma_2$ , and  $\sigma_3$  are the standard errors of the ratios of births to married years for each component age group, and  $w_1$ ,  $w_2$ , and  $w_3$  are the per cent of women in the whole study who were in each age group. Since the number of births for any one age group was small compared with the number of married

years,  $\sigma_1$ ,  $\sigma_2$ , and  $\sigma_3$  were computed by the formula  $\sigma = \sqrt{\frac{pq}{n}}$  where  $p$  equals

the number of births per married year, and  $q = 1 - p$ . The validity of this method of approximating the standard errors of the adjusted rates was tested by drawing twelve random samples of 200 cases each from the 1,944 carpenters' wives, computing the adjusted ratios for each sample, and comparing the standard deviation of their scatter with their standard errors obtained by means of the above formulas. The standard deviation of the rates computed for the samples was  $10.5 \pm 2.1$ , and the standard errors of the rates computed by the formulas range from 9.6 to 10.8.

was in part due, as has been shown in an earlier study, to the fact that our present index is unaffected by the relatively late marriages of professional people.<sup>7</sup> The clerks and semi-skilled workers constituted respectively the low-income groups of the white-collar and skilled-worker classes, but their birth rates were not characteristically higher.

When we come to consider specific occupational groups, it is possible only to speculate as to the reasons for the variation in the birth rates. If groups with similar characteristics have similar birth rates, inferences may be drawn, but such inferences must be in the nature of provisional hypotheses, which can be tested only by more precisely controlled investigations. The reader must also bear in mind the nature of our basic data. They were collected in 1910 and give the total number of children born prior to that date to married women then under 50 years of age. The occupations reported for the husbands were those followed at the time of the census. Their characteristics and requirements differed in some cases from those of the same occupations now. Moreover the occupations reported in 1910, especially in the case of the older groups, were not necessarily those followed by the husbands during the most fertile years of married life. Similarly, the families considered were living in the larger cities when enumerated, but we have no way of knowing the length of their residence in those cities. Since the period under consideration was one of heavy migration from country to city, many of the families observed must have moved to the city after at least some of their children were born.

In the professional class the birth rates for dentists and physicians were conspicuously low, and those for lawyers, teachers, and clergymen were high. It is possibly significant

<sup>7</sup>Notestein, Frank W.: *Social Classes and the Birth Rate. Survey Graphic*, April, 1931, xix, No. 1, pp. 38 ff.

that the least fertile occupational groups were also the groups likely to be most familiar with contraceptive techniques. The high birth rates for lawyers and school teachers are particularly striking. In the period under consideration, the education of both groups was substantially less expensive than that of physicians, but not less expensive than that of dentists. School teachers could begin earning at least a regular salary as soon as their training was completed, and lawyers were in a position to supplement their professional fees by a variety of business activities. Probably both the dentists and physicians had greater difficulty in securing a regular income in the early years of their practice. Nevertheless, in view of the similarity of their standards of living, of their positions and obligations in the community, and, presumably, of their social backgrounds, it is somewhat surprising to find physicians and dentists among the least fertile groups considered, and lawyers and school teachers, together with clergymen, among the most fertile occupations of the white-collar classes.

The traditional clergyman's family leads one to expect a high birth rate for the group. It would doubtless have been higher in relation to the other professions and lower in relation to the remaining occupations, if the influence of difference in marriage age had not been eliminated. The relatively high fertility of clergymen is often ascribed to their hesitancy to practice contraception and to their sense of the obligation to "be fruitful." Conceivably a different factor is involved. Many clergymen begin both their professional and married life in the country or small town where large families are relatively common, and only receive a call to the city after their families are well on the way toward completion. It is possible, therefore, that in observing city clergymen, we are observing an unusually large proportion of rural or semirural families which moved to the city too late to be influenced by

an urban environment. Much the same thing may have occurred in the case of school teachers. If the migration in these two groups was larger than that in other occupations of the class, their birth rates were not surprisingly high, especially when contrasted with that for lawyers.

The proprietary class had two occupational groups with conspicuously low birth rates. One of these, the druggists, whose birth rate was significantly lower than those for the other retail merchants, like the dentists and physicians of the professional class, probably had more than a lay knowledge of contraception. They also had long and irregular working hours and, doubtless, an interrupted home life. This latter characteristic was also common to the other low-birth-rate group of the class, comprising hotel, restaurant, cafe, lunch room, and saloon keepers.

There is no evidence that the higher-income groups of the proprietary class were characteristically either more or less fertile than those with lower incomes. The rates for brokers and bankers, for example, were not significantly different from those for insurance agents and retail dealers (except grocers and druggists), and the rates for manufacturers, officials of manufacturing, and managers of manufacturing were not significantly different from those for grocers and real estate agents. The rate for railroad conductors was the second highest in the class, although it was not significantly different from that of most of the other proprietary occupations. Interestingly enough, it was virtually the same as that for brakemen, from whom conductors are promoted, and was not significantly different from those for locomotive engineers, and flagmen, switchmen, and yardmen in the skilled and semiskilled classes. An even more striking example of the relation of early occupation to fertility is found in the birth rate for builders and building contractors. The rate

was significantly higher than that for any group in the proprietary class, and was not significantly different from those of any of the artisan builders for whom data are presented. The explanation is, of course, simple enough. Most of the contractors began as artisans. It appears that neither their "success" nor the factors inherent in it served to affect the fertility of the group.

Two of the clerical groups have almost the same fertility as higher income groups of the proprietary class which had similar working environments and were in the same line of advancement. The birth rate for salesmen and clerks in stores was virtually identical with that for the largest group of retail dealers, and the rate for "other clerks" was not significantly different from rates for bankers, manufacturers, and officials and managers of manufacturing. Commercial travelers appear to have been somewhat less fertile than retail dealers, but this may well reflect the interrupted home life of a conspicuously mobile group. Only two groups of the class, shipping clerks and draftsmen, had relatively high rates. The former was not definitely a white-collar occupation, and the rates for both groups were based on a relatively small number of cases.

Barbers and hairdressers, and the building and heavy metal trades were respectively the least and the most fertile groups of the skilled-worker class. The birth rate for barbers was not significantly different from those for druggists, keepers of hotels, restaurants, et cetera, and commercial travelers; and like these rates, may reflect the influence of long and irregular working hours on the home life of the group. The barber's occupation is definitely skilled, but like other domestic and personal service groups, his working environment is in many respects that of the white-collar classes. The fact that their occupation brings them in daily contact with mem-

bers of the white-collar classes, whose conspicuous consumption they have a vested interest in maintaining, perhaps influences their own social and economic standards and indirectly their fertility. The rates for artisan builders (and building contractors) are equalled or exceeded only by those for semiskilled operatives in factories and shops; unskilled laborers; blacksmiths, forgers, and hammermen; and moulders, founders, and casters of metal. It is perhaps suggestive that these groups were without exception engaged in occupations requiring unusual physical exertion.

Waiters and bartenders of the semiskilled class, like barbers, are neither a strictly manual-worker nor white-collar group. Their birth rate further illustrates the characteristically low fertility of persons engaged in domestic and personal service. It was not significantly different either from the rate for barbers or from that of the higher income group, to which they may hope to advance, comprising keepers of hotels, restaurants, et cetera.

The birth rates for the steam and street railroad trainmen were neither significantly different from each other nor from those of a number of other skilled and semiskilled workers. They were somewhat lower than those for the building trades, but were not different from those for machinists. Like the relatively infertile domestic and personal service groups, their home life must have been interfered with by their working hours, but unlike those groups they were not, as a whole, thrown into close personal contact with the white-collar classes.

Only a few occupational groups of the unskilled-laborer class were represented by enough cases to warrant the presentation of birth rates. These few were, without exception, more fertile than the majority of skilled or semiskilled workers. As in the case of the skilled workers, the rates for the building and heavy metal workers were the highest in the class.



## SUMMARY

This inquiry into the fertility of fairly homogeneous occupational groups of the native-white population of northern cities leads to a number of tentative generalizations, which, though far from conclusive, should point the way to more precisely controlled investigations.

The wide range of variation in the birth rates for the occupational groups of each broad class indicates that factors other than social-economic status affect fertility.

When the more extreme cases are disregarded, however, it appears that, even apart from the influence of differences in marriage age, there was an inverse association between fertility and the social status of the white-collar, skilled-worker, and the unskilled-laborer classes, as usually ranked.

Persons in different income groups but in the same line of occupational advancement had similar birth rates. The validity of this inference will be difficult to test until we have data relating to the entire occupational history of the husband.

There is no evidence that persons of higher economic status had characteristically different birth rates from those of the lower economic status in the same social classes.

The infertility of the three groups which were probably the best informed regarding contraceptive techniques suggests the influence of birth control.

An interrupted home life may have accounted, in part, for the infertility of certain occupational groups. Perhaps it was the principal cause of the low birth rates for commercial travelers, but the similarity of the rates for railroad trainmen and those for certain other skilled workers suggests that some additional factor was involved in the marked infertility of the domestic and personal service groups.

High fertility appears to have been characteristic of persons whose occupations required unusual physical exertion.



## THE ADAPTABILITY OF PAPER ROLL FILM IN ROENTGENOGRAPHY

by MARGARET WITTER BARNARD, M.D.<sup>1</sup>

WITH the increasing interest throughout the country in tuberculosis in children, there has come an increasing interest in and demand for chest roentgenograms. It is generally accepted that in the majority of cases in children physical signs, malnutrition (10 per cent or more underweight), and history of contact as obtained from the child are of little value; that a positive intradermal tuberculin reaction tells us only that at some time the child has harbored living tubercle bacilli in his body; and that in many cases the only means by which the extent and severity of a significant tuberculous pulmonary lesion can be determined is roentgenographic examination. The cost of a finished X-ray film is approximately eighty-five cents, and to this must be added the expense of personnel for the technique and the interpretation of the film. In most cases it is desirable to take one X-ray with the child facing the film and another with the child standing in an oblique position, and in some cases it is necessary, for satisfactory interpretation, to have stereoscopic films. The total cost must be in the neighborhood of \$1.25 per film, which prohibits the examination of large numbers of children, except for special studies.

Two methods have presented themselves for study as possibilities for reducing the expense of roentgenographic chest studies.

Fluoroscopy has the advantage of simple apparatus, a single operator, facility in dealing with a large number of

<sup>1</sup>Dr. Barnard is medical director of the Bellevue-Yorkville Health Center.

children in a comparatively short time and immediate interpretation. It has the decided disadvantages that fine detail is not revealed as clearly, that there is no permanent record for later comparisons and that the interpretation is usually the opinion of a single observer.

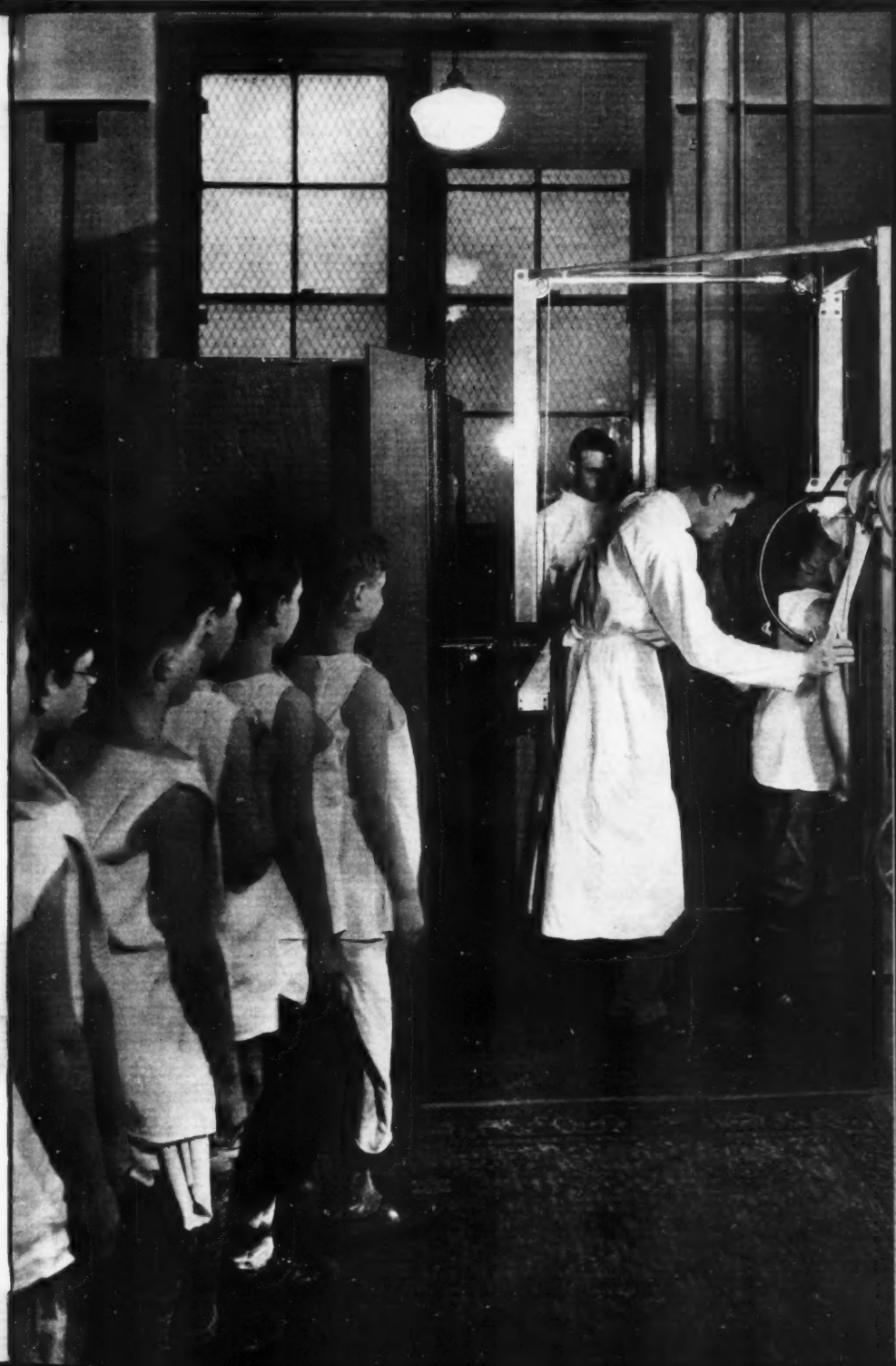
The other method is to find a film which shall be less expensive in itself, and which will lend itself to mass use with less expensive procedures and, at the same time, maintain adequately high technical standards.

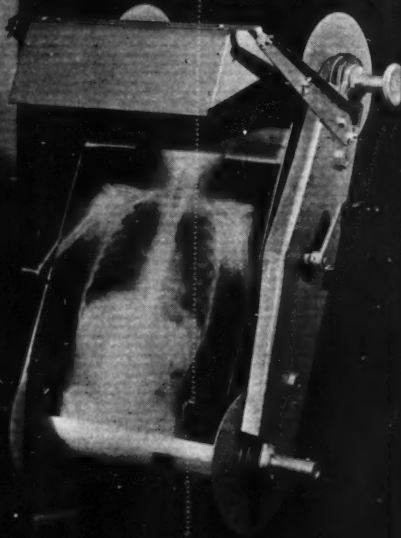
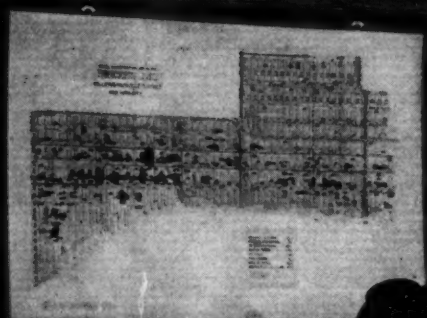
During the summer of 1931 a film consisting of emulsion on one side of a rather heavy paper was brought forward by the Powers Reproduction Company of New York City and, at the request of the National Tuberculosis Association, the Bellevue-Yorkville Health Demonstration staff undertook to study the efficiency of these films.

The paper, coated on one side with a photo-sensitive emulsion, may be placed in an ordinary film holder or cassette and the X-ray may be taken and developed in the usual manner. The result is an opaque positive which looks like a photographic reproduction of the transparent celluloid film which is in customary usage. It must be read by direct light instead of transillumination.

The technique of exposure is regulated in the same manner as with celluloid films. The tube target-film distance, the milliamperage, and the time of exposure are maintained as constant factors, the voltage being adjusted according to the thickness and development of the chest. At present, the tube target-film distance is forty inches for the posterior-anterior exposure and thirty-six inches for the oblique. The X-ray apparatus (Kelley-Koett 100-100) is set at 100 milliamperes, the time at 0.2 second, and the voltage is varied from fifty-two to eighty-eight K.V.P.

Although other solutions may be used, the best results





have been obtained by using a developer supplied by the manufacturers of the paper films.

In reading the films, there must be even illumination to avoid glare and reflection, which might cause errors in interpretation. The best method seems to be obtained from a 100-watt bulb behind a sheet of "daylight" glass.

To test the efficiency of these new films, a preliminary study<sup>2</sup> was made at the Bellevue-Yorkville Health Center of 100 cases, in which the clinical data and the findings of the celluloid film and paper film were all recorded separately, and then compared.

Generally speaking, the celluloid films are appreciably superior in showing fine detail. However, the paper films tally very closely and practically no significant lesions were missed in the 100 cases studied. It would seem that these new films would have a definite use as substitutes for the more expensive celluloid films in certain instances.

As a coarse screen to select cases for further intensive study from a large group, such as school children, food handlers, or factory employees, it is believed that these paper films would prove acceptable. As routine clinic records to show the extent of definite lesions or to record the progress of cases such as pneumothorax, they would be quite acceptable and much less expensive. For intensive study of fine detail and questionable lesions, one would probably need to check by means of celluloid films.

A further development in the use of the films and the reduction of cost is apparatus utilizing rolls of film with standardized, simplified technique, which makes possible the taking of two X-rays per minute with a fair degree of uni-

<sup>2</sup>Barnard, Margaret Witter; Amberson, J. Burns, Jr.; and Loew, Marion Franklin: Technique of Using Paper Films for Roentgenograms of the Chest. To appear in the *American Review of Tuberculosis*, June, 1932.

formity of quality. The roll of 250 films may be sent to the factory for developing and may then be read, still in the roll form, on a new viewing box equipped to handle the roll and illuminate it directly. Since the cutting, packaging, and wrapping of separate films adds greatly to their cost, and the placing of separate films in a viewing box takes considerable time and effort on the part of the interpreter, these new procedures to utilize roll films have reduced the cost to about one-third that of celluloid films. If an acceptable completed film, with its interpretation, could be accomplished for forty cents instead of \$1.25, a great deal more tuberculosis work, particularly among children, would be possible.

A more extensive study of 1,000 cases is now under way at the Bellevue-Yorkville Health Center. In this inquiry, as in the preliminary one, the clinical data and the findings of the celluloid film and paper film are being kept separately for subsequent comparison. It is anticipated that this second study will be concluded before the fall of 1932.

The Queensboro Tuberculosis Association is now using these new roll films in its project of X-raying 10,000 school children each year for four years. The X-ray apparatus is transportable and is set up in the school building.

After such large scale tests, it will be possible more closely to evaluate the assets and limitations of the paper films.

## SANITARY CONDITIONS IN A RURAL AREA OF CATTARAUGUS COUNTY<sup>1</sup>

### I

#### A SANITARY SURVEY OF FARM HOMES

by DOROTHY G. WIEHL

RURAL sanitary conditions constitute a major health problem and, for farm populations, a peculiarly difficult one, depending, as it does, on the individual farmer. First, the farmer must be educated as to the need for and the methods of safeguarding his water supply and otherwise providing a sanitary environment for his family. Then there is the cost of making improvements, which though it need not be large, is an important consideration to the average farmer. The importance of the problem to the health of rural populations and the unsatisfactory state of farm sanitation have been recognized by rural sanitarians and public health administrators, and though progress has been slow, much has been accomplished in recent years, as, for example, in the control of hookworm in many southern states. In the North, diseases directly attributable to sanitary conditions are less prevalent but, nevertheless, there is need for improvement in the sanitary environment of the average farm family. This was pointed out by Winslow<sup>2</sup> in his study of Cattaraugus County, New York. Winslow found the water supplies of many of the small villages and private farm supplies of "exceedingly dubious quality." "There is no reason,

<sup>1</sup>From the Division of Research, Milbank Memorial Fund and the Cattaraugus (New York) County Department of Health. The field data were collected by Clinton N. Woolsey with the cooperation of the Cattaraugus County Department of Health, and the water analyses were made in the County Department of Health Laboratory.

<sup>2</sup>Winslow, C.-E. A., Dr. P.H.: *Health on the Farm and in the Village*. New York, The Macmillan Company, 1931, Chapter IX.



however, to believe that conditions are different from those which obtain in most other counties," he writes. "They should be materially better when the excellent work of the County Engineer<sup>3</sup> has had the time to exert full effect."

Naturally the Health Department of Cattaraugus County has directed its attention largely to community sanitation, but it is not unaware of the needs of the individual farmer. An opportunity to study farm conditions was afforded by a sanitary survey of farms in five rural townships which was made during the summer of 1930, in connection with special studies of morbidity and of the epidemiology of certain diseases which have been carried on in a rural section of Cattaraugus County since September, 1929, by the United States Public Health Service in cooperation with the Milbank Memorial Fund and the County Health Department. Data from this survey relating to farm sanitation are summarized in this report<sup>4</sup> which is based only on families that were also in the morbidity study. The results give an indication of the nature and extent of the sanitary problem in a rural area which is believed to be typical of most rural counties in New York and probably in the northeastern part of the United States.

The farmers were classified into five broad economic classes by the field investigators for the special morbidity studies as follows: "comfortable," "upper moderate," "low moderate," "poor," and "very poor." The rating is chiefly an impression of the economic status of the family and the classifications

<sup>3</sup>A full-time sanitary engineer was appointed by the County Department of Health in 1929, one year before appraisal of conditions in the County was made by Professor Winslow.

<sup>4</sup>Two other reports based on this survey were: A Note on the Extent of Tuberculin Testing and Tuberculosis Infection in Cows in a Rural Area of Cattaraugus County. *Milbank Memorial Fund Quarterly Bulletin*, April, 1931, ix, pp. 46-51. Incidence of Contagious Abortion Among Cows in Cattaraugus County. *Ibid.*, pp. 52-53.



are relative within the area rather than being related to any broader population group. Thus a family classed as comfortable here might in other more prosperous districts be considered of only moderate income, but the classes undoubtedly represent real differences in the economic status of the families in the study. These ratings make it possible to consider the sanitary environment and equipment in relation to the economic status of the farmer.

The general cleanliness of the farm premises was rated by the sanitary investigator according to a five-class scale using "A" for the highest grade and "E" for the lowest. Only 15 per cent of the farm homes, as shown in Table 1, were rated "D" or "E," which might be interpreted as noticeably

Table 1. Cleanliness of farm premises according to economic status of the family.

ECONOMIC STATUS	CLEANLINESS RATING <sup>1</sup>					
	Total	A	B	C	D	E
NUMBER OF FARM HOUSES						
All income groups	565	183	174	124	65	19
Comfortable	103	66	30	7	0	0
Upper moderate	225	95	80	36	11	3
Lower moderate	133	18	49	44	19	3
Poor and very poor	104	4	15	37	35 <sup>2</sup>	13
PER CENT OF FARM HOUSES						
All income groups	100.0	32.4	30.8	21.9	11.5	3.4
Comfortable	100.0	64.1	29.1	6.8	0.0	0.0
Upper moderate	100.0	42.2	35.6	16.0	4.9	1.3
Lower moderate	100.0	13.5	36.8	33.1	14.3	2.3
Poor and very poor	100.0	3.8	14.4	35.6	33.7	12.5

<sup>1</sup>The investigators arbitrarily rated the houses using "A" for the cleanest and "E" for the most dirty and untidy.

<sup>2</sup>Of these, one is "D" or "E."

untidy and dirty, while 32 per cent were rated "A." Cleanliness shows a marked association with the economic rating, as is evident in Table 1, and none of the farms of the highest economic class were rated "D" or "E," but 46 per cent of the farms of the "poor" and "very poor" were so rated.

The houses on about two-thirds of the farms were completely screened and another fourth were partially screened. (Table 2) Of the families classed as "comfortable," 93 per cent had homes that were completely screened, but less than 20 per cent of the poor families had completely screened their homes. Evidently the screens were not always used, since all the homes with complete screening were not reported as having "few" flies, and homes with "abundant" flies were more numerous than the homes without screens.

Table 2. Screening of farm homes and flies noted in the home at time of visit, July to September, 1930.

ECONOMIC STATUS	SCREENING				FLIES			
	All Homes	None	Par- tial	Com- plete	All Homes	Abun- dant	Mod- erate	Few
NUMBER OF HOMES								
<i>All income groups</i>	554	48	146	360	554	109	126	319
Comfortable	100	0	7	93	102	0	14	88
Upper moderate	223	4	46	173	222	19	48	155
Lower moderate	129	12	42	75	128	31	38	59
Poor and very poor	102	32	51	19	102	59	26	17
PER CENT OF HOMES								
<i>All income groups</i>	100.1	8.7	26.4	65.0	100.0	19.7	22.7	57.6
Comfortable	100.0	0.0	7.0	93.0	100.0	0.0	13.7	86.3
Upper moderate	100.0	1.8	20.6	77.6	100.0	8.6	21.6	69.8
Lower moderate	100.0	9.3	32.6	58.1	100.0	24.2	29.7	46.1
Poor and very poor	100.0	31.4	50.0	18.6	100.0	57.8	25.5	16.7

ECONOMIC STATUS	SOURCE OF WATER				PERCENTAGE FROM SPECIFIED SOURCE			
	All Sources	Public Supply	Spring	Well	All Sources	Public Supply	Spring	Well
All income groups	590	5	279	306	100.0	0.8	47.3	51.9
Comfortable	107	2	48	57	100.1	1.9	44.9	53.3
Upper moderate	231	3	108	120	100.0	1.3	46.8	51.9
Lower moderate	241	0	72	69	100.0	0.0	51.1	48.9
Poor and very poor	111	0	51	60	100.0	0.0	45.9	54.1

Table 3. Sources of water for farm families in Cattaraugus County, New York, according to economic status of the family.

In slightly more than half of the homes there were only a few flies.

The water supply for household use in this area comes about equally from springs and from wells. Of the 590 farmers reporting on the source of water, 279, or 47 per cent, used spring water, 306, or 52 per cent used well water, and 5 farms were supplied from a village water system. The source of the water supply for families in different economic classes is shown in Table 3. The use of wells or springs apparently is determined by chance and shows no variation according to the economic status of the family.

The wells are classified as to whether dug, driven, or drilled in Table 4. The type of well evidently did not vary according to the economic rating of the family, although a special analysis of water samples from about one-third of the wells showed that the dug well is less satisfactory than either driven or drilled wells. The results of the water analyses are discussed on page 146.

Spring water was in most cases piped to the house. This convenience, as we might expect, varied with the economic status, and all but 2 per cent of families in the highest eco-

ECONOMIC STATUS	NUMBER OF WELLS				PERCENTAGE OF SPECIFIED TYPE			
	All Types <sup>1</sup>	Drilled	Dug	Driven	All Types	Drilled	Dug	Driven
<i>All classes</i>	297	119	95	83	100.0	40.1	32.0	27.0
Comfortable	56	18	21	17	100.0	32.1	37.5	30.4
Upper moderate	117	50	29	38	100.0	42.7	24.8	32.5
Lower moderate	66	30	23	13	100.0	45.5	34.8	19.7
Poor and very poor	58	21	22	15	100.0	36.2	37.9	25.9

<sup>1</sup>Type of well not specified in nine cases.

Table 4. Type of well used by farm families in different economic classes, in a rural section of Cattaraugus County, New York.

economic class had piped the water to the house, but only 73 per cent of the poor families had done so. (Table 5.) More important from the sanitary aspect is the protection of the springs against pollution. Nearly 60 per cent of the farmers (Table 6) had enclosed the spring in a wooden or cement basin, and covered it or built a spring house around it; another 30 per cent had some form of protection, though less complete, and 10 per cent had made no effort to shield the spring from

outside pollution. Carelessness in protecting the spring was definitely more frequent among the poor farmers.

Twenty per cent of these farm houses had an inside running

Table 5. Percentage of farm families in a rural section of Cattaraugus County, New York, that piped the spring water according to economic status of the family.

ECONOMIC STATUS	TOTAL USING	WATER PIPED TO HOUSE	
	Spring	Number	Per Cent
<i>All income groups</i>	262 <sup>1</sup>	223	87.4
Comfortable	44	43	97.7
Upper moderate	103	90	87.4
Lower moderate	67	55	82.1
Poor and very poor	48	35	72.9

<sup>1</sup>Not stated whether water was piped to house for seventeen families.

water toilet, about 3 per cent had chemical toilets, and the remaining 77 per cent of farm families had only an outdoor privy. (Table 7.) Homes equipped with indoor water closets were found much more frequently among the group of farmers in the upper economic class. The percentage of homes with flush toilets was 42 for farmers classed as "comfortable" and the percentage steadily diminished with economic status to 5.5 per cent for farmers classed as "poor" or "very poor."

The effluent from about two-thirds of the flush toilets drained into cesspools, from one-fifth into septic tanks, and from the remaining one-tenth of the toilets drainage was into a nearby creek. From a sanitary standpoint, sewage disposal into the creek may not be very satisfactory depending upon the amount of running water in the creek and its proximity to the house. In at least one case the creek was dry at the time of the survey and an unsanitary condition existed.

The privies varied in type but half of them were the old-fashioned surface privy, 30 per cent were box privies, 9 per cent were the leaching vault type, and 5 per cent were the concrete vault type, as shown in Table 8. The surface privy was the most common type even on the farms of families classed as of "comfortable" or "upper moderate" economic

Table 6. Percentage of farm families in a rural section of Cattaraugus County, New York, that protected their springs against pollution, according to economic status.

ECONOMIC STATUS	TOTAL	BOTH COVERED AND BOXED OR IN SPRING HOUSE	COVERED OR BOXED	SOME OTHER PROTECTION	NO PROTECTION	PER CENT WITH SPECIFIED TYPE OF PROTECTION			
						Both Covered and Boxed	Covered or Boxed	Other Protection	No Protection
All income groups	225	150	40	39	26	58.6	15.6	15.2	10.2
Comfortable	46	33	6	6	1	71.7	23.9	1.3	1.3
Upper moderate	101	59	16	18	8	58.4	15.9	17.8	7.9
Lower moderate	63	36	11	8	8	57.1	17.4	12.7	12.7
Poor and very poor	45	22	7	7	9	48.9	15.5	15.6	20.0

ECONOMIC STATUS	NUMBER OF HOMES				PER CENT OF HOMES			
	Total Homes	Water Closet	Privy	Chemical Toilet	Total Homes	Water Closet	Privy	Chemical Toilet
<i>All income groups</i>	589	118	456	15	99.9	20.0	77.4	2.5
Comfortable	108	45	61	2	100.1	41.7	56.5	1.9
Upper moderate	232	53	176	3	100.0	22.8	75.9	1.3
Lower moderate	139	14	117	8	100.1	10.1	84.2	5.8
Poor and very poor	110	6	102	2	100.0	5.5	92.7	1.8

Table 7. Type of sewage disposal in a rural section of Cattaraugus County, New York, according to economic status of the family.

status, but the box privy and leaching vault type were found more frequently on these farms than on those of families of "poor" economic status.

The care exercised in keeping the privy in sanitary condition is equally as important, if not more important, than the type of privy. Only in a few cases was it stated that the privy was cleaned more often than every three months, except for chemical toilets which were nearly always cleaned frequently, at least monthly. Two or three cleanings a year was the usual report for surface privies, and box privies were cleaned somewhat more frequently. The farmers of low economic status were definitely more careless about the sanitary condition of the privy, nearly half reported that they cleaned the surface privy yearly, one-tenth that they "seldom" cleaned it, and another tenth "never."

In the majority of cases, the investigator noted whether or not the privy was flyproof and also whether the condition was "satisfactory," "full," or "overflowing." Slightly less than half of the privies were flyproof but over 60 per cent of those seen by the investigator were recorded as in satis-

factory condition. The percentages vary greatly according to the economic rating and of the privies owned by the "comfortable" 67 per cent were flyproof and 89 per cent in satisfactory condition, but of those owned by the "poor" families only 28 per cent were flyproof and 32 per cent in satisfactory sanitary condition.

The location of the privy in relation to the well was in nearly every case fairly satisfactory. On only one farm did the investigator report that the ground sloped steeply from the privy to the well. In five cases there was a moderate slope from the privy toward the well. About 12 per cent of the privies were 25 feet or less distant from the wells and 35 per cent were more than 50 feet distant.

For adequate protection of the health of farm families, it is obvious that there is great need to interest the farmer and to educate him in the methods and importance of providing

Table 8. Type of privy used in a rural section of Cattaraugus County, New York, according to economic status of the family.

ECONOMIC STATUS	TOTAL HOMES	TYPE OF PRIVY				
		Surface	Box	Leaching Vault	Concrete Vault	Other
NUMBER OF HOMES						
All income groups	430	230	135	41	22	2
Comfortable	56	27	23	3	3	0
Upper moderate	164	81	48	25	8	2
Lower moderate	114	58	44	6	6	0
Poor and very poor	96	64	20	7	5	0
PER CENT OF HOMES						
All income groups	100.0	53.5	31.4	9.5	5.1	.5
Comfortable	100.1	48.2	41.1	5.4	5.4	0.0
Upper moderate	100.0	49.4	29.3	15.2	4.9	1.2
Lower moderate	100.1	50.9	38.6	5.3	5.3	0.0
Poor and very poor	100.0	66.7	20.8	7.3	5.2	0.0

sanitary surroundings. While unsanitary conditions on the farm are a menace chiefly to the health of the individual family and the opportunity for serious infections to occur or to be spread is much less than where groups of families live together in villages and towns, the right of the farm family to hygienic home surroundings and the responsibility of health authorities to aid in providing such an environment is recognized. Ignorance of the farmer concerning sanitary matters and indifference which is frequently based on ignorance are basic to the problem, but it is apparent that the farmer's economic status is a weighty contributing factor.

## II

## ANALYSES OF WATER SUPPLIES OF 212 FARMS

by EDMUND K. KLINE, DR. P.H.<sup>5</sup>

SAMPLES of water from 214 different farm supplies included in the sanitary survey upon which Miss Wiehl has reported, were submitted to the County Department of Health laboratory. Two samples were not marked as to the type of well from which they were taken and are omitted from the tabulations.

Table 9. Quality of water samples from various sources on farms in rural Cattaraugus County, New York.

SOURCE OF WATER	NUMBER OF SPECIFIED QUALITY					PERCENTAGE OF SPECIFIED QUALITY				
	Total	Good	Fair	Poor	Bad	Total	Good	Fair	Poor	Bad
<i>All sources</i>	212	90	31	38	53	100	42	15	18	25
Springs	124	44	25	24	31	100	36	20	19	25
Wells	82	42	6	13	21	100	51	7	16	26
Drilled	44	24	5	9	6	100	55	11	20	14
Dug	21	8	0	3	10	100	38	0	15	47
Driven	17	10	1	1	5	100	59	6	6	29
Public supplies	6	4	0	1	1					

<sup>5</sup>Director of Laboratories, Cattaraugus County Department of Health.



SOURCE OF WATER AND QUALITY ON B. COLI TEST	NUMBER OF SAMPLES GIVING SPECIFIED BACTERIA COUNT PER C.C.							PER- CENTAGE HAVING A COUNT LESS THAN 10
	Total Sam- ples	More than 1,000	500- 1,000	100- 500	50- 99	10- 49	0-9	
<i>Springs—all</i>	122 <sup>1</sup>	11	6	10	5	17	73	59.8
Good—Fair	67 <sup>1</sup>	3	2	3	1	10	48	71.7
Poor—Bad	55	8	4	7	4	7	25	45.5
<i>Wells—all</i>	80	8	1	9	2	14	46	57.5
Good—Fair	46	5	1	4	1	3	32	69.6
Poor—Bad	44	3	0	5	1	11	14	31.9
<i>Drilled or driven wells</i>	59	3	1	7	2	9	37	62.8
Good—Fair	38	3	1	4	1	2	27	71.2
Poor—Bad	21	0	0	3	1	7	10	47.7
<i>Dug wells</i>	21	5	0	2	0	5	9	42.8
Good—Fair	8	2	0	0	0	1	5	62.5
Poor—Bad	13	3	0	2	0	4	4	30.7

<sup>1</sup>Count for two samples unknown.

Table 10. Bacteria count on water samples from various sources and of different quality taken from farm supplies in rural Cattaraugus County, New York.

An arbitrary classification was adopted for laboratory findings of "confirmed *B. coli*" on the following basis:

Good—No confirmed *B. coli*

Fair—1 or 2 positive 10 c.c. portions (of a total of 5)

Poor—3 to 5 positive 10 c.c. portions

Bad—Positive in all 10 c.c. portions (5) and in addition positive in 1 or more, 1 or 1/10 c.c. portions.

Only the classification "good" would be acceptable in most other work, but so far as we know there is no standard for rural water supplies and this grading would seem to be quite lenient enough to allow for a certain amount of deviation from stricter standards applicable to public supplies.

The results of this tabulation are found in Table 9 which also shows the percentage of each group of samples included

DEPTH OF WELL	NUMBER OF WELLS			PERCENTAGE OF WELLS		
	Total	B. COLI CLASS		Total	Good—Fair	Poor—Bad
		Good—Fair	Poor—Bad			
<i>Drilled wells</i>	39	28	11	100.0	71.8	28.2
75 ft. or more	21	16	5	100.0	76.2	23.8
25-74 ft.	18	12	6	100.0	66.7	33.3
<i>Driven wells</i>	11	7	4	100.0	63.7	36.3
25 ft. or more	5	4	1	100.0	80.0	20.0
Less than 25 ft.	6	3	3	100.0	50.0	50.5
<i>Dug wells</i>	13	6	7	100.0	46.2	53.8
25-49 ft.	7	3	4	100.0	42.9 <sup>1</sup>	57.1
Less than 25 ft.	6	3	3	100.0	50.0	50.0

Table 11. Depth of well according to type and quality of water on farms in Cattaraugus County, New York.

in each class. Taken as a whole 42 per cent of the samples were good, 15 per cent fair, 18 per cent poor, and 25 per cent bad. The best showing, excluding the few samples taken from public supplies, was made by driven wells with 59 per cent good and the poorest showing by dug wells with 47 per cent bad.

The total counts of the bacterial content are presented in Table 10 according to the source of the water and also according to sanitary quality as

Table 12. Samples giving "presumptive *B. coli* tests" which failed to "confirm" as *B. coli* according to the survey in Ellicottville, New York, 1930.

Final Quality Classification	Good	Fair	Poor	Bad	Total
<i>Total Wells</i>	29	16	11	5	61
Drilled	3	1	3	0	7
Dug	5	0	1	2 <sup>1</sup>	8
Driven	2	0	0	0	2
Springs	19 <sup>1</sup>	15	7	3	44

<sup>1</sup>Anaerobes were found in 2 good springs and 1 bad dug well. All of the other specimens gave typical "colon" colonies on Endo media but failed to produce gas from the colonies fished from these plates. All of them were gram negative bacilli.

These 61 specimens gave 144 cultures which were divided as follows: Anaerobes—2 ten c.c. tubes and 1 one-tenth c.c. tube. Nonfermenters—110 ten c.c. tubes, 25 one c.c. tubes, and 6 one-tenth c.c. tubes.

shown in Table 9. The fact should be noted that samples were not iced when brought to the laboratory. The bacterial content of waters from different sources did not vary significantly, except that fewer samples from dug wells had a bacterial content of less than 10 per c.c. than samples from any other source. The percentage of each kind of samples which showed a bacteria count of less than 10 per c.c. does show a correlation with the sanitary quality.

The quality of the water according to the depth of wells, where this information was given on the survey sheet, is compiled in Table 11. There seems to be no correlation between depth and quality, and the deepest well, 260 feet, was a poor one.

One of the most interesting results of the survey work is shown in Table 12, which lists the samples which gave presumptive tests for *B. coli* (fermentation in lactose broth in forty-eight hours) but which failed to show completed *B. coli* tests in all tubes giving the presumptive test. While sixty-one samples were shown to belong in this group, sometimes several tubes from one sample were concerned. The number of tubes involved is shown in the accompanying summary.

	<i>Tubes</i> <i>Inoculated</i>	<i>Tubes</i> <i>Fermenting</i>	<i>Tubes</i> <i>Confirming</i>	<i>Anaerobes</i>	<i>Non-</i> <i>fermenters</i>
10 c.c.	1,070	582	470	2	110
1 c.c.	428	119	94	0	25
1/10 c.c.	428	44	37	1	6
<i>Total</i>	<i>1,926</i>	<i>745</i>	<i>601</i>	<i>3</i>	<i>141</i>

The group marked nonfermenters gave gas in the original fermentation tube, grew on Endo media, usually with the sheen and coloration typical of colon colonies, but failed to ferment when single colonies were reinoculated into lactose broth. They were gram negative bacilli. As shown in the summary most of them came from springs.

These results are of great interest because such types of organisms have repeatedly demonstrated in experimental laboratory studies on the influence of salamanders on the quality of water supplies.<sup>6</sup>

The results of special studies of pollution of spring water by salamanders were reported by Dr. Kline before the Laboratory Section of the American Public Health Association, Montreal, September, 1931. They may be summarized as follows:

Salamanders of the family Plethodontidae are frequently found in the rural spring water supplies of the Appalachian range of mountains. Field studies show that these animals live in large numbers deep in the underground streams supplying springs and that at certain seasons they wander from the water and feed in the surrounding land area. At this time they may become infected with colon bacilli. Laboratory experiments show that after becoming infected their gastro-intestinal tracts may act as incubators or reservoirs from which large numbers of *B. coli* are expelled over a considerable period of time. A continuation of this process after they have returned to the underground stream above the spring may influence the laboratory tests so as to suggest condemnation of an otherwise safe water supply. Methods for the protection of such supplies should be revised so as to eliminate such salamander pollution.

The full report, "Some Experimental Evidence Concerning the Interpretation of Laboratory Findings in Rural Water Supplies of the Appalachian Area" by Edmund K. Kline, Dr. P.H., and Nelson M. Fuller, will be published in a forthcoming issue of the *American Journal of Public Health*.

## A TABLE FOR ASCERTAINING ELAPSED TIME IN YEARS AND DECIMALS OF A YEAR BETWEEN ANY TWO DATES<sup>1</sup>

by RAYMOND PEARL AND JOHN R. MINER

**S**TANDARD calendar divisions of time constitute a minor nuisance to statisticians. Months are neither equal in length nor simple fractions of a year. Weeks go only unevenly into months. The most satisfactory way of dealing with a mass of material relating to elapsed time appears to us to be to express the time between any two calendar dates in terms of years and decimal fractions of a year.

In connection with an investigation of certain biological aspects of the population problem, which we are carrying on in cooperation with the Division of Research of the Milbank Memorial Fund, it has been necessary to deal with large numbers of records involving the time elapsing between certain events. To facilitate this work the table here printed was prepared. On the original record cards are recorded, among other things, the following items: date of birth of husband and of wife; date of marriage; dates of birth of children. For purposes of tabulation we need to have the ages of husband and wife (i.e., elapsed time from the birth of each to the date of the record); the duration of the marriage; elapsed time between successive pregnancies, et cetera. The accompanying table makes the computation of such elapsed times from dates of events extremely simple and rapid. It has seemed desirable to make the table available to other workers by publication, because the need for a table of this kind comes

(Continued on p. 154)

<sup>1</sup>From the Department of Biology of the School of Hygiene and Public Health, the Johns Hopkins University; and the Division of Research, Milbank Memorial Fund.



	a	JULY	b	a	AUG.	b	a	SEPT.	b	a	OCT.	b	a	NOV.	b	a	DEC.	b
.586	.496	1	.504	.581	1	.419	.666	1	.334	.748	1	.252	.833	1	.167	.915	1	.085
.584	.499	2	.501	.584	2	.416	.668	2	.332	.751	2	.249	.836	2	.164	.918	2	.082
.581	.501	3	.499	.586	3	.414	.671	3	.329	.753	3	.247	.838	3	.162	.921	3	.079
.578	.504	4	.496	.589	4	.411	.674	4	.326	.756	4	.244	.841	4	.159	.923	4	.077
.575	.507	5	.493	.592	5	.408	.677	5	.323	.759	5	.241	.844	5	.156	.926	5	.074
.573	.510	6	.490	.595	6	.405	.679	6	.321	.762	6	.238	.847	6	.153	.929	6	.071
.570	.512	7	.488	.597	7	.403	.682	7	.318	.764	7	.236	.849	7	.151	.932	7	.068
.567	.515	8	.485	.600	8	.400	.685	8	.315	.767	8	.233	.852	8	.148	.934	8	.066
.564	.518	9	.482	.603	9	.397	.688	9	.312	.770	9	.230	.855	9	.145	.937	9	.063
.562	.521	10	.479	.605	10	.395	.690	10	.310	.773	10	.227	.858	10	.142	.940	10	.060
.559	.523	11	.477	.608	11	.392	.693	11	.307	.775	11	.225	.860	11	.140	.943	11	.058
.556	.526	12	.474	.611	12	.389	.696	12	.304	.778	12	.222	.863	12	.137	.945	12	.055
.553	.529	13	.471	.614	13	.386	.699	13	.301	.781	13	.219	.866	13	.134	.948	13	.052
.551	.532	14	.468	.616	14	.384	.701	14	.299	.784	14	.216	.868	14	.132	.951	14	.049
.548	.534	15	.466	.619	15	.381	.704	15	.296	.786	15	.214	.871	15	.129	.953	15	.047
.545	.537	16	.463	.622	16	.378	.707	16	.293	.789	16	.211	.874	16	.126	.956	16	.044
.542	.540	17	.460	.625	17	.375	.710	17	.290	.792	17	.208	.877	17	.123	.959	17	.041
.540	.542	18	.458	.627	18	.373	.712	18	.288	.795	18	.205	.879	18	.121	.962	18	.038
.537	.545	19	.455	.630	19	.370	.715	19	.285	.797	19	.203	.882	19	.118	.964	19	.036
.534	.548	20	.452	.633	20	.367	.718	20	.282	.800	20	.200	.885	20	.115	.967	20	.033
.532	.551	21	.449	.636	21	.364	.721	21	.279	.803	21	.197	.888	21	.112	.970	21	.030
.529	.553	22	.447	.638	22	.362	.723	22	.277	.805	22	.195	.890	22	.110	.973	22	.027
.526	.556	23	.444	.641	23	.359	.726	23	.274	.808	23	.192	.893	23	.107	.975	23	.025
.523	.559	24	.441	.644	24	.356	.729	24	.271	.811	24	.189	.896	24	.104	.978	24	.022
.521	.562	25	.438	.647	25	.353	.731	25	.269	.814	25	.186	.899	25	.101	.981	25	.019
.518	.564	26	.436	.649	26	.351	.734	26	.266	.816	26	.184	.901	26	.099	.984	26	.016
.515	.567	27	.433	.652	27	.348	.737	27	.263	.819	27	.181	.904	27	.096	.986	27	.014
.512	.570	28	.430	.655	28	.345	.740	28	.260	.822	28	.178	.907	28	.093	.989	28	.011
.510	.573	29	.427	.658	29	.342	.742	29	.258	.825	29	.175	.910	29	.090	.992	29	.008
.507	.575	30	.425	.660	30	.340	.745	30	.255	.827	30	.173	.912	30	.088	.995	30	.005
	.578	31	.422	.663	31	.337				.830	31	.170				.997	31	.003

r of next year.

the patient was February 3, 1898, and  
s May 20, 1931, subtract 1898 from  
. The fraction under column a cor-  
-tieth is .381, and the fraction cor-  
y third is .090. Subtract .090 from  
ne age of the patient at delivery is

d, the date of birth of the patient  
ion of its year than the date of deliv-  
er year from the latter minus 1, and  
of a year, add the fraction under col-  
responding to the patient's birthday  
column a corresponding to date of  
ate of birth of the patient was Octo-  
e of delivery was January 16, 1931,  
- 1, leaving 23 years. The fraction

under column b corresponding to October fifteenth is .214,  
and the fraction under column a corresponding to January  
sixteenth is .041. Add .214 and .041, giving .255. The age  
of the patient is 23.255 years.

To find age of the husband at date of record, substitute  
in the above rules "date of birth of husband" for "date of  
birth of patient," and "date of record" for "date of deliv-  
ery," and proceed as above.

To find the duration of marriage at the time of delivery  
of a particular child substitute in the above rules "date of  
marriage" for "date of birth," and proceed as before.

To find the interval between the births of two successive  
children substitute in the above rules "date of birth of  
earlier child" for "date of birth" and "date of birth of later  
child" for "date of delivery" and proceed as before.

And so similarly for other problems.

up in such a wide variety of statistical work outside the range of our particular immediate problems relating to age, marriage, et cetera.

#### PLAN OF TABLE

The table consists of twelve triple columns, one for each month of the year. The three columns for each month give (a) the fraction of a year from January first up to the date specified in the second or middle column, and (b) the fraction of a year from this date specified in the second or middle column up to January first of the next year. The fractions are given to three places of decimals. The table is calculated on the basis of a 365-day year. Such years are three times as numerous as 366-day years. The error made by regarding leap years as 365 days instead of 366 days long would only affect the third decimal place of the fractions in any ordinary work. We have, however, included February twenty-ninth in the table, and given it the same fraction as March first. It will only come into use in cases where February twenty-ninth is a limiting date, at one end or the other, of an elapsed period of time. Except in cases where this occurs it is our recommendation that the user of the table give no thought whatever to the matter of leap years. The error made by so doing will be insignificant in any practical statistical work to which the table is likely to be put.



## NEWS DIGEST

### ●● *George Livingston Nichols*

**G**EORGE LIVINGSTON NICHOLS, for twenty-five years an active member of the Board of Directors of the Milbank Memorial Fund, died at his home at Katonah, New York, on March fourth. He was seventy-one years old.

Mr. Nichols was a close friend of Elizabeth Milbank Anderson, founder of the Fund, and became a director when the Fund was established in 1905. Two years ago, having withdrawn from most of his law and financial interests, he resigned his position on the Board of Directors after a quarter-century of service.

Born in Brooklyn on May 9, 1860, Mr. Nichols was engaged during most of his busy life in law and financial activities in New York City. He received the degree of A.B. from Williams College in 1881 and then studied at the Columbia Law School from which he was graduated in

1883. His admission to the New York bar came that same year. He was one of the original partners in the law firm of Masten and Nichols, and during his business life a director in numerous industrial corporations.

### ●● *Dr. Welch Warns Against Undue Economy in Public Health Work*

**A** WARNING that undue economy is public health work because of the depression is extremely dangerous, particularly to children, was sounded by Dr. William Henry Welch, chairman of the Advisory Council, of the Milbank Memorial Fund in his opening address at the tenth annual meeting of the Council held on March sixteenth and seventeenth at the New York Academy of Medicine.

"Any undue retrenchment in health work is bound to be paid for in dollars and cents as well as in the impairment of the peo-

ple's health generally," said Dr. Welch. "We can demonstrate convincingly that returns in economic and social welfare from expenditures for public health service are far in excess of their costs.

"Too great economy as far as health is concerned, because of the current depression, is particularly dangerous to the welfare of growing children. Undernourishment of children, for example, is not likely to show itself immediately, but is bound to show its effects later, when it is probably too late to remedy. The ground lost by undernourishment in childhood may never be regained."

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● ● ● *The Tenth Annual Advisory Council Meeting*

AN interesting experiment in "group thinking" and a comprehensive discussion of public health problems featured the program of the tenth annual meeting of the Advisory Council. The meeting opened with a general session of about fifty members addressed by Dr. William H. Welch and John A. Kingsbury, secretary of the Fund. Thereupon, departing from procedure in former years, the Council was divided into five

round-table groups, each with a chairman to guide the discussion and a *rapporteur* to summarize it. These conferences continued through the afternoon.

One group, presided over by Surgeon-General Hugh S. Cumming of the United States Public Health Service, discussed health centers in New York City; Boston, Massachusetts; and Los Angeles County, California. Another group dealt with the education of health personnel, school health education, and policies in public information regarding the prevention of venereal diseases. Dr. Linsly R. Williams, director of the New York Academy of Medicine, presided at the morning session, and Homer Folks, secretary of the State Charities Aid Association, at the afternoon session of this group. Dr. Thomas Parran, Jr., New York State Commissioner of Health, took an active part in the discussions.

A third group discussed tuberculosis in children, particularly in New York City; Cattaraugus County, New York; and Baltimore, Maryland. The use, under carefully controlled conditions, of the *Bacillus Calmette-Guérin* for immunization was reported on by Dr. William H. Park, of the New York City De-

partment of Health. Dr. Charles J. Hatfield, executive director of Henry Phipps Institute, Philadelphia, presided. Dr. James Alexander Miller, of the College of Physicians and Surgeons, discussed tuberculosis studies made at Bellevue Hospital.

Population studies absorbed the attention of one group, over which Dr. Robert E. Chaddock, of Columbia University, presided. There were reports on reproductive histories, differential fertility by social classes, and modes of research into the factors affecting human fertility. Dr. Raymond Pearl, of the Johns Hopkins University, participated. Public health nursing, particularly in Boston and New York, was discussed by a separate group, led by Miss Lillian A. Hudson, of Teachers College, Columbia University.

The *rapporteurs* summarized the group discussions for the respective chairmen, who made reports the following day to the executive session of the Council.

During the afternoon of the same day Dr. Hsun-Yuan Yao gave an illustrated talk on the health demonstration at Ting Hsien, China, of which he is the medical director, and which the Fund is supporting. Following this the Council heard a discus-

sion of the economic aspects of medicine and health, the principal speakers being Dr. R. M. Atwater, Commissioner of Health of Cattaraugus County; Dr. Louis I. Dublin, of the Metropolitan Life Insurance Company; and Dr. C.-E. A. Winslow, of the Yale University School of Medicine.

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● ● *Tenth Annual Dinner of the Fund's Boards of Counsel*

A DINNER given on March seventeenth by the Board of Directors of the Milbank Memorial Fund concluded this year's meeting of the Fund's Advisory Council. On this occasion Dr. William Henry Welch, of the Johns Hopkins University, formally resigned as chairman of the Council, a position he had held since its organization in 1922. His successor is Dr. Livingston Farrand, president of Cornell University, who addressed the gathering. Dr. Farrand was welcomed by Albert G. Milbank, president of the Fund, who greeted the guests on behalf of the Board and who paid a warm tribute to the service of Dr. Welch. Mr. Milbank delivered an address in which he pointed out that the principles underlying preventive medicine

could well be applied to economic problems. He made a plea for a clear perception of the social obligations of business and the need of practical idealism on the part of the individual.

Dr. Ray Lyman Wilbur, United States Secretary of the Interior, delivered an address on the economics of public health and medical care. He presented and commented on important findings of the Committee on the Costs of Medical Care, of which he is chairman.

Studies of the Committee indicate that present methods of providing and paying for medical service are unsatisfactory and cost is unevenly distributed among the people, causing hardship to persons of low incomes, Dr. Wilbur said in his address which will appear in the July issue of the *Quarterly Bulletin*.

While this dinner celebrated the tenth anniversary of the Advisory Council, the Fund itself is twenty-seven years old, having been incorporated in 1905.

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●●● *"Medicine and the State"*  
by Newsbolme to Appear during  
his Visit in America

SIR Arthur Newsbolme will  
come to the United States

in May to lecture on public health. During this visit his new book entitled "Medicine and the State" will be published.

Sir Arthur will address the American Medical Association at its annual meeting in New Orleans, which extends from May 9th to May 12th. He will deliver the Hermann M. Biggs Memorial Lecture before the New York Academy of Medicine on May 16th.

In "Medicine and the State," Sir Arthur offers his personal interpretation of and conclusions from the factual studies of public health problems and procedure in several European countries which have been published in the three volumes of "International Studies," this work having been undertaken for the Milbank Memorial Fund. The author is particularly concerned with constructive plans for co-operation in official and other organized health activity (including health insurance) and private medical practice.

Dr. William Henry Welch, in a foreword, says that readers of the new volume, as of Sir Arthur's other publications, "will recognize an unusual combination of powers of critical judgment with those of constructive suggestion based upon

broad humanitarianism united with practical consideration of what is attainable under existing conditions." He quotes with approval Sir Arthur's statement that "average humanity has not yet learned to use communal privileges with due regard to communal economy in the absence of a personal motive for carefulness."

"Medicine and the State" will be published by George Allen and Unwin, London, and the Williams and Wilkins Company, Baltimore.

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●● *Report of the New York State Health Commission Published*

THE effectiveness of the county as a public health administrative unit is urged by the New York State Health Commission in its final report published under the title "Public Health in New York State." Governor Franklin D. Roosevelt, who appointed the Commission in May, 1930, summarizes the findings in an extensive foreword.

While noting that mortality from all causes in the State has decreased 14 per cent since 1913, and giving full credit for the progress made, the Governor declares that there is marked in-

equality of health services in different communities, unevenness of popular sentiment for popular action, and lack of understanding regarding measures necessary to preserve individual health.

Primarily for protection against milk-borne diseases, the Commission recommends a county-wide basis of milk control outside of the larger cities. For better tuberculosis control the Commission urges, among other things, early completion of the three district state sanatoria authorized by the Legislature in response to a preliminary report made a year ago. The next great public health achievement, it is declared, can be the suppression of venereal disease, awaiting only the use of methods proved effective against other communicable diseases.

An edition of five thousand copies of the volume has been issued bearing the imprint of the New York State Department of Health, Albany. Governor Roosevelt's foreword and the chapter on local public health service, public health nursing, tuberculosis, social hygiene, and child hygiene will also be issued as reprints.

Members of the Commission, to the work of which the Fund

has contributed, are: Dr. Livingston Farrand, chairman; State Commissioner Thomas Parran, Jr., secretary; George W. Cottis, M.D.; Simon Flexner, M.D.; Homer Folks; Edward L. Keyes, M.D.; John A. Kingsbury; Mrs. Henry Goddard Leach; Henry Morgenthau; Matthias Nicoll, Jr., M.D.; John M. O'Hanlon; William H. Ross, M.D.; Miss Katharine Tucker; and Linsly R. Williams, M.D.

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● ● ● *Activities in the Bellevue-Yorkville Health Demonstration, 1931*

THE program of the Bellevue-Yorkville Health Demonstration in 1931, under the leadership of Health Commissioner Shirley W. Wynne, chairman of its governing boards, emphasized to an even greater degree than in previous years those activities of the demonstration which enabled the Health Department to enlarge its activities and to try out experimentally new methods in public health administration. Clinical services were amplified, as well as extended, new health services installed, and additional equipment provided. The year just closed also marked one of the

most successful and fruitful years of the demonstration in the field of health education.

With the aid of funds supplied by the demonstration, the Health Department was enabled to provide additional medical, nursing, and clerical staffs, a tuberculosis consultant, and a nose and throat specialist for the tuberculosis service; to establish two new preschool clinics in the Bellevue section of the district; and to continue its mental hygiene unit at the demonstration center.

Throughout November the safety education campaign was intensively waged in every part of the district. In this work the demonstration had the benefit of the hearty cooperation of the Departments of Police, Health, and Education, the National Safety Council, the churches, numerous welfare and social organizations, and the radio, and press. Cardinal Hayes made an appeal for all to assist in the campaign and his message was published in the newspapers and broadcast over the radio. A total of 145,000 leaflets were distributed, 5,100 posters were used, and there were twenty-five neighborhood meetings, and twenty-two school assemblies conducted. Merchants gave

their windows for displays and a home safety exhibit added to the interest of the campaign.

In the field of health education, campaigns were also conducted in tuberculosis, diphtheria, and social hygiene, and over 400,000 pieces of printed matter, including posters, were distributed to residents, doctors, dentists, schools, welfare and health agencies, stores, industrial plants, clubs, and churches.

The medical services of the health demonstration had a busy year. Patients attending all of the medical clinics, including those newly enrolled in 1931 and those carried over from previous years, numbered 7,598. Of these, 3,401 were registered in the tuberculosis service and 4,197 in the pediatrics service. Clinic visits in the twelve-month period totaled 31,738.

In the consultation chest service for patients under the care of private physicians, conducted at the Center, 1,742 new tuberculosis suspects were examined and made a total of 2,696 visits during the year. This service is designed for patients of private physicians who cannot afford to pay the fee of chest specialists or the cost of X-ray chest examinations. Patients are ac-

cepted here only when sent directly by their own physicians. The complete findings and an opinion on the case are forwarded only to the patient's physician.

At the Yorkville district chest clinic, which consists of the tuberculosis service for adults and the special tuberculosis service for children, a total of 1,048 new suspect cases were admitted and these, together with the 411 brought forward from 1930, received 3,439 examinations during 1931. At this clinic the patients apply directly for diagnosis and placement. Every effort has been made to bring in the contact cases and, as a result, 76 per cent of the contacts have been examined.

The three baby health stations of the district had 800 new enrollments during 1931, the three preschool clinics, 725, the school children's clinic, 317, and the city-wide diagnostic cardiac clinic, 610. All these 2,452 newly enrolled patients, as well as the 1,745 patients brought forward from 1930, made a total of 24,698 visits to the Department of Health child hygiene services of the district.

The diagnostic cardiac clinic housed at the Center is conducted by the Department of



Health in cooperation with the Board of Education, the Heart Committee of the New York Tuberculosis and Health Association, the Employment Center for the Handicapped, and the demonstration. The clinic was organized for children who apply for working papers and are found to have suspicious cardiac conditions. The demonstration supplied an electrocardiograph and X-ray facilities. Each child is seen at least twice, and the cardiac study includes an electrocardiogram, teleoroentgenogram, urinalysis, cardiac history, and complete physical examination. A close follow-up is made of each patient with organic heart disease. He receives a home visit by the school nurses, who urges his parents to obtain for him medical supervision. There were 610 new patients registered during the year at this service.

A complete mental hygiene unit was set up by the demonstration in November, 1930. Its objectives are to carry out, among the Department of Health nurses in the Bellevue-Yorkville district, an educational mental hygiene program and to be of service to patients referred by them or by doctors in the Health Center clinics.

An important contribution of this service is the progress that has been obtained in working with and through the Department of Health nurses and the medical members of the staff.

The Department of Health nursing service in the Bellevue-Yorkville district, during the greater part of 1931, consisted of 34 nurses, the Yorkville and Bellevue units each averaging 17 nurses. The nurses of the former district made 15,087 visits, and those of the latter, 23,988 visits. For the past three years, under the generalized instead of the specialized nursing system, the Yorkville unit has noticeably extended its usefulness. It was accordingly decided to apply the generalized method to the Bellevue unit as well, and this change became effective in May.

The nursing service has endeavored, with increasing success, to develop the generalized system on a family basis and to consider the social, economic, and mental hygiene problems and their relation to health. Because of the close cooperation with family welfare organizations which this has necessitated there has come an increased understanding of the functions and problems of social agencies



which has resulted in improved relationships.

The demonstration maintained as consultants to the nurses experienced workers in the fields of nursing, nutrition, social service, and mental hygiene. These consultants gave the nurses help and advice in their special fields, and facilitated cooperation with other agencies. Often the consultants helped them to recognize the significance of problems with which they came in contact and made sources of information available to them.

The year brought increasing evidence not only that the demonstration is proving valuable to the Health Department as a center for practical administrative experimentation, but that it is having influence in improving many phases of the public health work beyond the boundaries of the Bellevue-Yorkville district.

SAVEL ZIMAND

Administrative Director, Bellevue-Yorkville Health Demonstration

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### •• Why Thirty Health Centers in New York City?

THE measured steps taken and the neighborhood facts assembled for each of the five

boroughs of Greater New York before the decision to recommend thirty health centers "to assure public health protection and health facilities available and accessible to every section of New York" is interestingly related in the January, 1932, issue of the *Journal of Preventive Medicine*, Chicago, in an article on "Vital Statistics in the Development of Neighborhood Health Centers in New York City," by Godias J. Drolet and Louis Weiner.

Surveys are described which gave satisfactory answers to several questions. How many centers should there be, and what size populations should they serve? In which sections of the City do conditions indicate a more urgent need for the first centers? And, finally, at each place, what should be the major objectives and items in the local programs of activities of each center? What staffs will be required?

A widely representative Committee on Neighborhood Health Development, of the Department of Health of the City of New York, was first organized; financial support was also granted by the Milbank Memorial Fund; cooperation of private welfare and health agen-



infectious diseases, tuberculosis, and venereal diseases.

The student of public health service, including the administrator in local metropolitan areas, will find in the complete "Statistical Reference Handbook," compiled by Godias J. Drolet and Marguerite P. Potter, and published by the Committee on Neighborhood Health Development of the Health Department, as well as in the recent summary article in the *Journal of Preventive Medicine*, mines of practical suggestions for the orderly consideration of direct and more effective measures "to bring public health protection into every neighborhood and to make preventive medicine reach every home."

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●●● *Studies to Indicate Most Effective Use of New York's New Health Centers*

THE Division of Research of the Milbank Memorial Fund has undertaken a series of studies on the best public health procedures and types of administrative organization for the new municipal health centers in New York City. The institution of the studies followed a recommendation of the Technical Board of the Fund as a

result of a request for such cooperation by the Committee on Neighborhood Health Development of which Commissioner Shirley W. Wynne is the chairman.

The purpose of these studies is to assist the New York City Health Department and the various voluntary agencies to make the most effective use of the opportunity for decentralization—or, rather, localization—of health activities in the new health districts and health centers which has been afforded by the recent appropriation of four million dollars from the City of New York. In proposing these studies it was believed that a disinterested group of experienced public health experts, co-operating closely with official and unofficial agencies acquainted with actual conditions in the City, would perform a much needed task for which busy executives had neither time nor facilities. It is believed that these studies should assist in discovering the needs for various services in the different health center areas, in ascertaining what types of various services, organization, and methods of administration are best suited to these areas, and in evaluating the effectiveness

of these services when they are put into operation.

Professor Ira V. Hiscock of the Department of Public Health of the Yale School of Medicine has immediate supervision of these studies, with the assistance of Dr. Margaret Witter Barnard, medical director of Bellevue-Yorkville Health Center, and Dr. Carl E. Buck, field director of the American Public Health Association, Committee on Administrative Practice. Several organizations are cooperating in the conduct of the work in an advisory capacity, including the City Department of Health, the Committee on Neighborhood Health Development, the Coordinating Committee of the New York Academy of Medicine, the New York Tuberculosis and Health Association, the New York Committee on Mental Hygiene, and the Welfare Council of New York City.

Miss Dorothy Wiehl of the Fund's staff, with two field workers, in connection with a

series of maternity and child health studies in the Bellevue-Yorkville district, is securing supplementary data for a sample of families in that area to show a cross-section picture of the needs in individual families and how completely those needs are being met. A similar cross-section study has been undertaken by one field worker in the proposed Mott Haven health district. Miss Marian G. Randall of the Fund's staff, with the cooperation of the Fund's Nursing Advisory Committee, is making an evaluation of the nursing service in the Bellevue-Yorkville district in order to secure data which may be helpful in planning the nursing work in other districts, and will shortly begin a similar study in Mott Haven. A comprehensive analysis of the vital statistics of the Mott Haven district is being made by Miss Marguerite Potter of the Committee on Neighborhood Health Development, of which Kenneth D. Widdemer is the executive secretary.